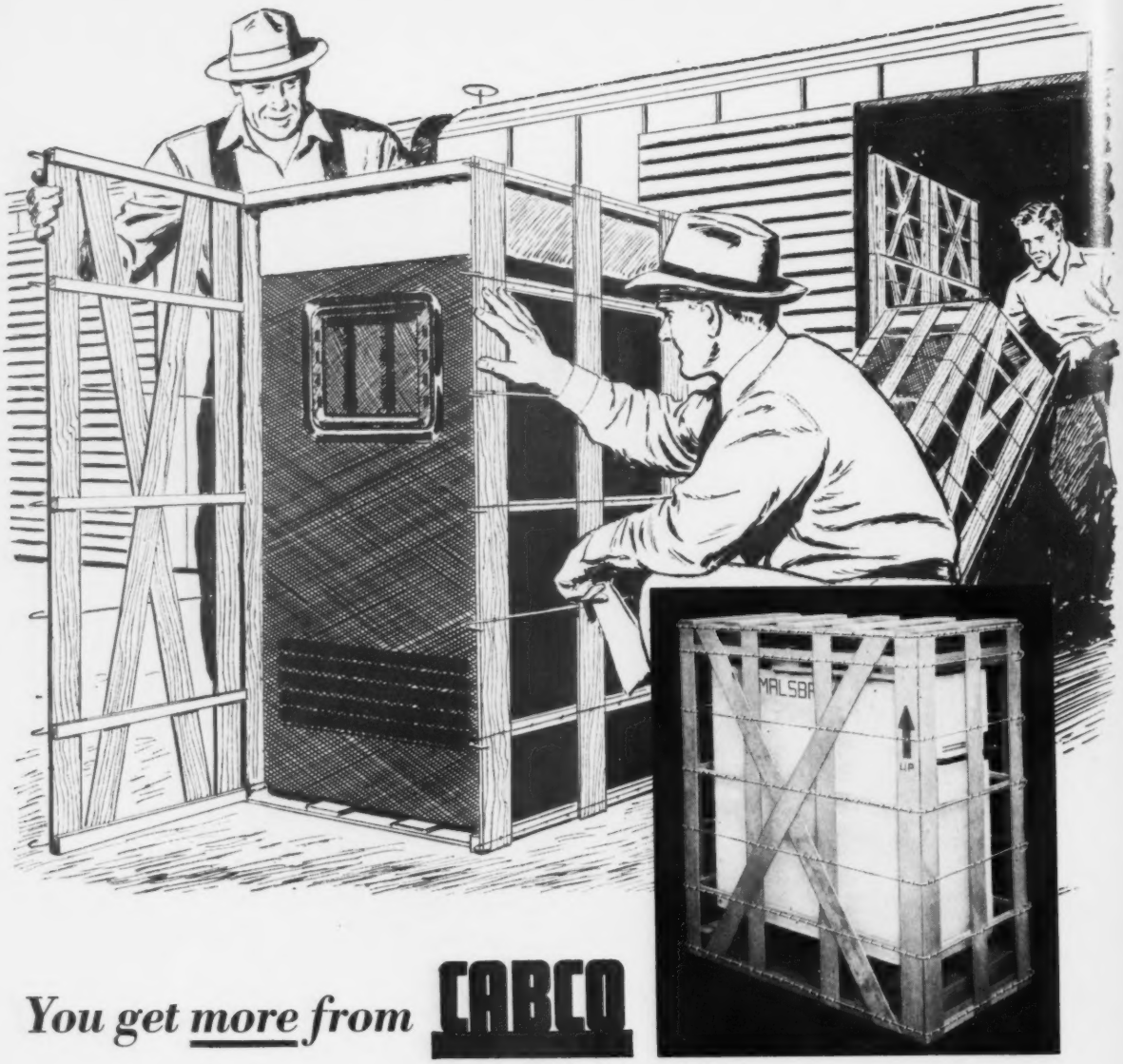
Western Industry

June 1953

Instrumentation is an important factor in operating ice plants. Here is the recording panel for a big railroad icing station in Wyoming for refrigerated shipments.
. . . see page 24

— FOUR KEYS TO YOUR PLANT'S FUTURE —

- **DEMAND PRODUCTION ENGINEERING. Don't trust all to the designer . . . p. 29**
- **BE SURE OF YOUR FACTS. Scientific instruments widen your range . . p. 33**
- **KEEP EQUIPMENT IN ORDER. Watch pumps and electrical systems . pp. 37, 46**
- **STUDY THE HORIZON. New sources for energy loom up . . . . . pp. 32, 70**



You get more from CABCO

Performance... in a shipping container, performance means product protection—result of sound container engineering and careful manufacture. In Cabco containers, the great strength and lightness of Douglas Fir is combined with the natural shock absorbing action of the wirebound design. Each cleat, slat—even spacing of the stout steel wires—is precisely engineered for perfect fit, maximum protection. The outstanding performance of these Cabco wirebounds is another reason why Cabco is the West's foremost manufacturer of wooden shipping containers—and has been since 1883.

MALSBARY MANUFACTURING COMPANY'S Model 110 Steam Cleaner ships as a National Safe Transit Approved unit in custom-designed Cabco wirebound. Wirebound not only delivers the 540 lb. machine undamaged, ready to use; but light, tough container saves 40 lbs. on tare weight, cuts crating time from 45 to 8 minutes. Crate is used for export as well as domestic shipment.

Sold only by

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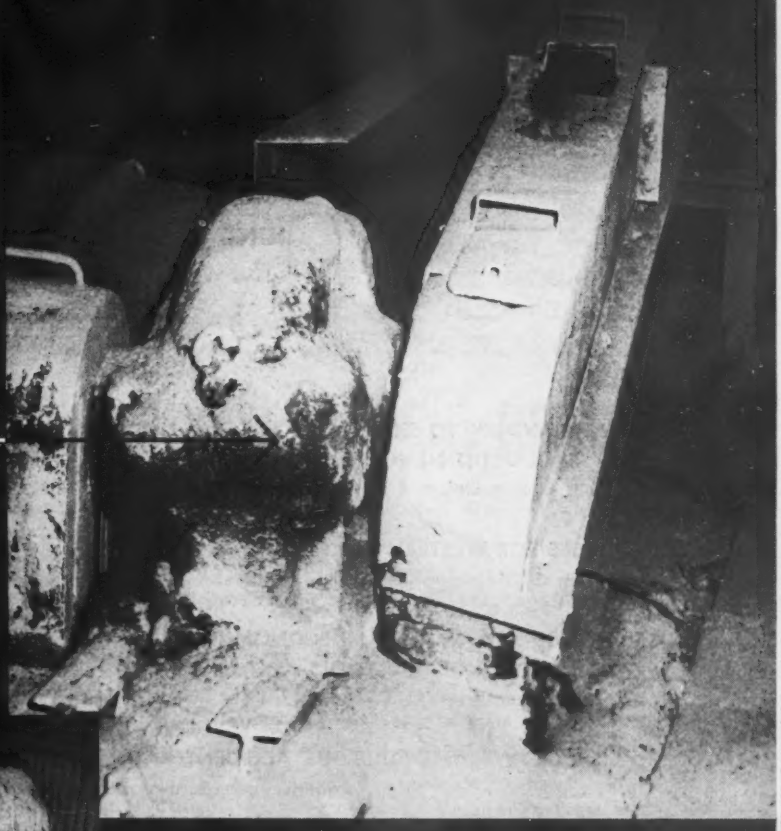
2762

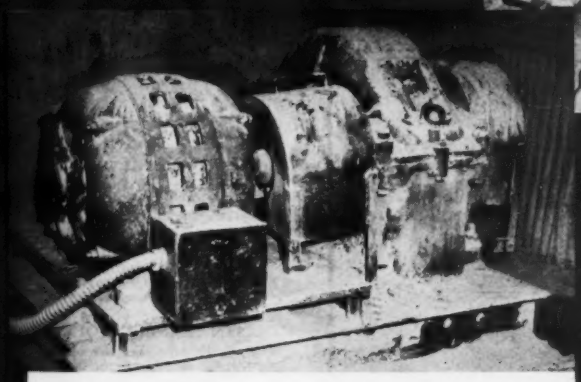
Cabco containers are a product of the California Barrel Company, Ltd., the West's foremost designer and manufacturer of wooden shipping containers

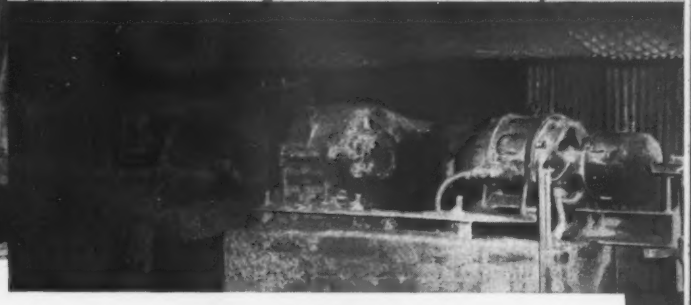
PACIFIC-WESTERN
Speed Reducers

RUGGED and DEPENDABLE!

Designed for application in YOUR industry







Rugged and Dependable... Pacific-Western reducers have to be just that to give satisfactory service in a cement plant installation as shown above. Operating conditions are far from ideal, yet these units are performing with a minimum of maintenance and a maximum of satisfaction to the customer.

Thousands of Pacific-Western speed reducers are in service in all types of industries. This extensive experience has resulted in standardization of a complete range of units, any shaft arrangement, ratio or horsepower rating, in double, triple or single reduction. This means that there is a Pacific-Western reducer JUST RIGHT for your needs.

Fast delivery on many popular types and sizes. Let us quote you on your needs or provide the services of an application engineer in assisting you in your selection. No obligation.

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Pacific Gear & Tool Works

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San Francisco
Belmont
(S. F. Peninsula)
Lynwood
(Los Angeles County)
Houston

Western Industry

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STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol O.H.T. Grease

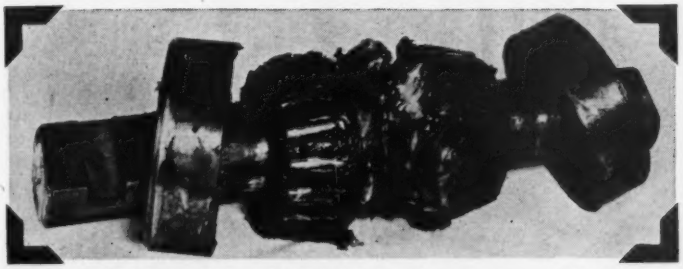
UNIT Sealed tractor rollers — 5.344-inch roller bearings

LUBRICATOR 1¼ lbs. grease, sealed in

CONDITIONS On bulldozer — rock excavation

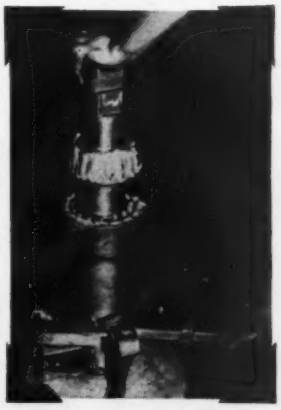
FIRM D+M Machine Works, Torrance, Calif.

Track-roller bearings work year without greasing!



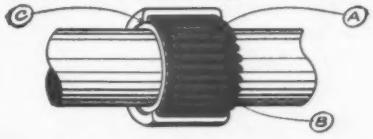
THESE TWO 5.344-INCH TIMKEN BEARINGS, part of a D & M Machine Works sealed assembly (right) taken from a track-layer bulldozer, showed only 0.0025 inch wear on each despite more than a year of rugged operation on highway construction work in the Arizona desert. The job was so tough that some roller shafts were bent; when project was completed, dozer was "walked" 30 miles on rough road. Yet, lubricated with Calol O.H.T. Grease, unit required no field servicing. When opened, it contained no grit, dust, or deposits—even color of grease was the same except for surface discoloration due to a dye used in the black neoprene seals.

CALOL O.H.T. GREASE is used by the D & M Machine Works, Torrance, Calif., for lubrication of all assemblies. Bearings are squeezed full and grease is later put in the shaft housing—a total of 1¼ lbs. in each unit.



REMARKS: Calol O.H.T. Grease has solved unusual lubrication problems in many lines of industry. It is recommended for all types of plain and antifriction bearings in extremely severe service.

How Calol O.H.T. Grease protects bearings in severest operating conditions



Used in any type of bearing under any operating condition, high temperature-low speed, high speeds to 10,000 rpm, temperatures from minus 10°F. to 400°F., Calol O.H.T. Grease will last indefinitely.

A. Contains special oxidation inhibitor—helps prevent rusting, corrosion, hardening of grease at any time.

B. Resists high temperatures—eliminates coking and formation of deposits.

C. Provides excellent seal against water... lubricates efficiently in slight moisture.

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STANDARD OIL COMPANY OF CALIFORNIA

Gladding, McBean & Co.

REFRACTORIES Reporter

NEWS-VIEWS OF INTERESTING WESTERN INDUSTRIAL DEVELOPMENTS

Spray-Coat Fortifies Steel Forge Furnace

Spalling and erosion have long been a problem in steel forge furnaces where intense temperatures are encountered. At the forge division of the Earle M. Jorgenson Steel Co., Los Angeles, plant engineers combat this condition by spray-coating furnace walls and dome with Gladding, McBean Dry Bond, dry type air-setting cement. The Dry Bond cement, mixed with water to a thin consistency, is sprayed from a bucket by means of a compressed-air sprayer. The coating is applied to a thickness of from ⅛ to ¼". It takes the brunt of the corrosive attack, thus protecting the firebrick in the furnace enclosure. The photograph above shows the spraying operation.

IT TAKES FIREBRICK TO MAKE FLOWER POTS

American Containers Corporation of Gardena, California, specialize in the production of clay flower pots for horticultural use. They are now manufacturing approximately 40,000 units per day in a newly built tunnel kiln, pictured above during construction. This modern kiln, constructed by J. T. Thorpe, Inc., was made from Gladding, McBean Royal, Trojan and Diablo clay firebrick. Photograph at left shows the forming operation.

SHUTTLE KILN FIRES CERAMIC "FURNITURE"

In the Ceramic industry, "furniture" refers to Ceramic spacers which are used to separate various layers of pottery ware as it goes through the kiln. This "furniture" must be fired at high temperature so that it will stand up under the heat of repeated use. The unusual shuttle kiln pictured at right, was recently constructed at the Thorley Pottery Supply Co. plant at Hollydale, California. Most of the refractories used in the construction of this highly specialized kiln, including the mortar, were manufactured by Gladding, McBean & Co. In this application, interior temperatures during the firing cycle reach approximately 2500 degrees F.

GMB

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FEEDING A PRODUCTION-HUNGRY PLANT WITH A

One Cubic Yard "Spoon"

Feeding raw materials to a production-hungry plant is just one of many uses for the multi-purpose Allis-Chalmers HD-5G Tractor Shovel. It receives bulk materials, then carries them directly to mixing hoppers, conveyors or storage as needed. In addition, this powerful crawler excavates for new construction, handles coal, cleans up and loads waste . . . also clears snow and maintains yards and parking areas.

Interchangeable attachments, such as bulldozer blades, special buckets, lift fork, crane hook and trench hoe, add still further to its usefulness.

Tractor Shovels are also available on the three larger sizes of Allis-Chalmers crawler tractors, giving a range of standard buckets from one to four cubic yards — and up to seven cubic yards for light materials.

Let your Allis-Chalmers dealer tell you more about how you can mechanize your materials-handling the efficient tractor shovel way.

Receives Material at Plant

The HD-5G scoops a heaping load of any material at the unloading trestle, then delivers it directly to mixing hopper, conveyor, or storage area. Truck wheels, idler and support roller bearings are positively sealed against grit and moisture and require lubrication only once every 1,000 hours. This feature alone saves about 30 minutes' greasing time a day.

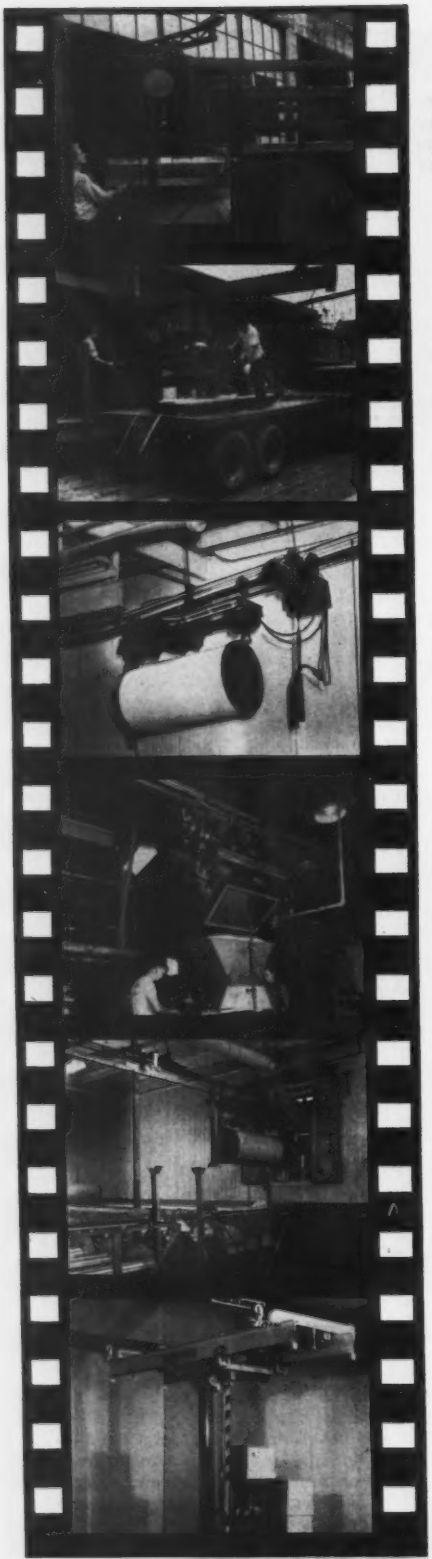
Keeps Production Moving—*Fast!*

The HD-5G feeds bulk materials in exact required amounts for uniform mixture — a full cubic yard at a scoop. In handling light materials, a two cubic yard bucket doubles output. Special fast reverse greatly speeds operation on short runs. This flexible tractor starts boosting production as soon as it's put on the job . . . no waiting for costly installations or changes in plant layout when you mechanize materials handling the Allis-Chalmers tractor-shovel way.

Builds Storage Piles—*Anywhere*

This fast-working tractor maintains large stockpiles in the open or under a protective shed. Crawler tracks provide traction and flotation to work right up on the pile, enabling it to put many more cubic yards of material into a given area. Tracks also give long life in cullet and similar material as only steel can.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U.S.A.



Quickly removes die blocks from trucks

Saves $30 each truck unloaded

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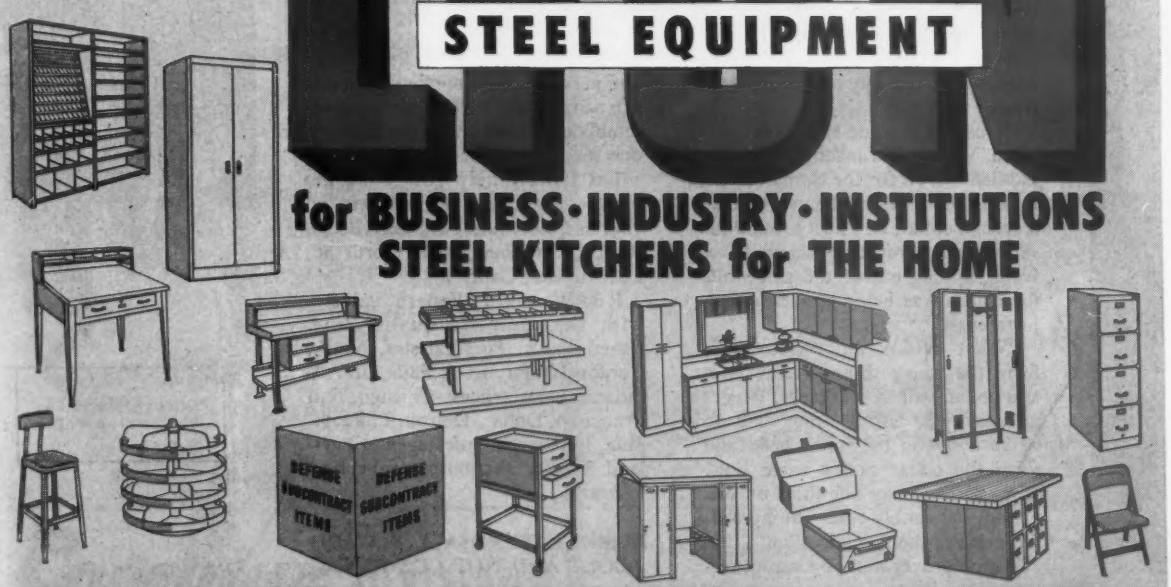

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• Lockers	• Cabinet Benches	• Bar Racks	• New Freedom Kitchens	• Flat Drawer Files	• Folding Chairs	• Sorting Files	• Shop Boxes
• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Revolving Bins	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood-Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

"A Triple play BY RB&W REALLY SAVED US PLENTY!"

"It took us by surprise," Al went on, "when an RB&W man told us* he could speed up assembly of this precision screw-and-clamp unit and save us money besides. We figured we'd been doing O.K. the old way."

"What was the old way?" asked Mac, who'd recently started in at the shop.

"Well, it was a one-two-three operation. We used to machine the slotted-head screw for the clamp on that machine over there. Then we'd make a special collar, and fit it around the screw head to prevent the screw-driver from slipping out of the slot while the clamp was being applied or adjusted.

"What RB&W did was to cold-form the whole thing—screw, slot and collar—all in one piece. Wasn't an easy job, either—they had to strike a slot in the screw head and form the collar at the same time. Now we're saving one-third on our previous assembly costs—along with the price of the special collar."

Which proves that you can generally cut costs, if you look hard enough . . . even in such simple things as fasteners. It also underlines the creative approach to fastening problems you can expect from RB&W, as well as practical experience in designing and fabricating. If the fastener you need can't be supplied from our extensive stock, we'll study your assembly operation and make the right one for the job.

Let RB&W help you make the most efficient use of fasteners on your assembly line. Address RB&W, West Coast Plant, 4466 Worth St., Los Angeles, Calif.

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RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

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*George K. Garrett Co., Philadelphia, Pa.

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2. Use relatively inexpensive ridge ventilators—and save!

If you're buying *daylight*, *insist* on "CORRULUX-80" and get the most for your money!

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3. On engineering	no monitor design necessary.
4. On labor	no flashing, closures, framing necessary.
5. On maintenance	no cracked skylights—ever!

Corrulux

- flat sheets for glazing
- corrugated sheets to nest with corrugated metal or asbestos

QUALITY FEATURES	BENEFITS
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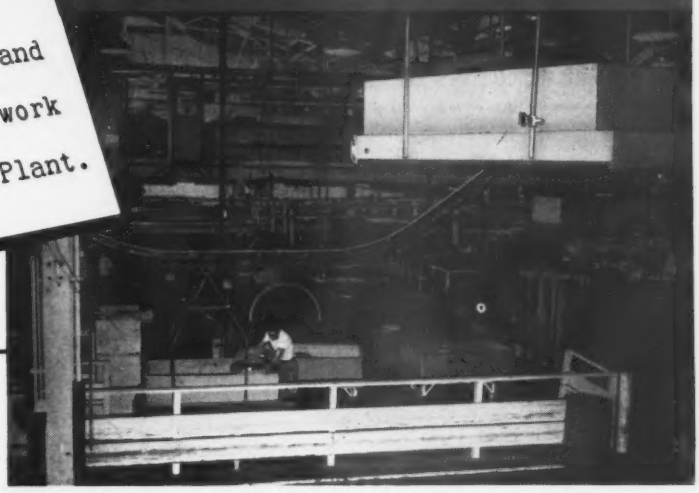
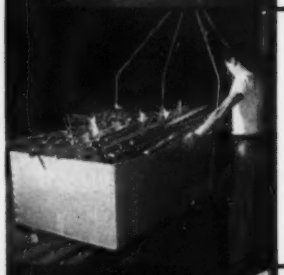
CASE HISTORY

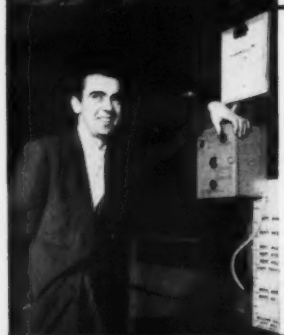
Saves time, space, and releases 100 trailers and 2 tractors for other work at Douglas Aircraft Plant.



2000 feet of continuous trolley track connects two major fabrication buildings in a manner to expedite material flow. Note 14 ft. clearance under conveyor housings for vehicles.



Load of scrap leaving stop-station enroute to salvage department. Carton-type box placed on carrier tray prevents loss of small parts.



Operator presses button on master control box. Entire conveyor system can be started or stopped at any one of seven stop stations.

"It's a success" says Douglas Plant Engineer

TRAFFIC AND CONFUSION ARE ELIMINATED in the huge Douglas Aircraft Plant at Santa Monica. Jervis B. Webb engineers working with the Douglas engineering department provided an answer to their material handling problems. Now almost a half mile of continuous overhead conveyor track is threaded through and between two major fabrication buildings in a manner to approximate material flow during production periods. This conveyor system serves stock rooms, fabrication departments and paint shops. The entire system can be started or stopped at any one of seven stop stations, eliminating aisle traffic, tow trucks and trailers, with a saving of time, space and manpower. Douglas plant engineers proclaim the Webb designed, manufactured and installed system a success. Call Jervis B. Webb of California to solve your conveyor problems.

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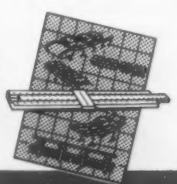

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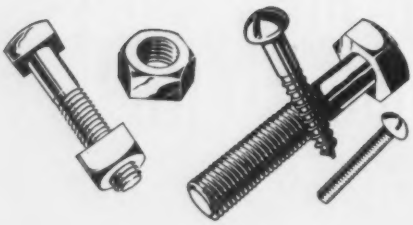

Essential to All These Products

You know how essential the right fasteners are to your product. They must be dependable, economical, properly designed and rigidly manufactured to measure up to your own product standards.

In many cases, you can meet every requirement by ordering standard fasteners from the most complete line made for industry, by National.

And, when you need a special fastener . . . there's no problem either when you call on National. For more than 60 years, our reputation has grown and our facilities have expanded . . . because we have been able to answer industry's need for an endless variety of specially engineered headed and threaded products.

We offer you experience and facilities second to none. We can tell you how your part can be produced economically and speedily . . . in the volume you need . . . and to the National standards of quality.

For the right fastener, essential to your product, send us your specifications or call your nearest National representative.

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Div. of The National Screw & Mfg. Company, Cleveland 4, Ohio

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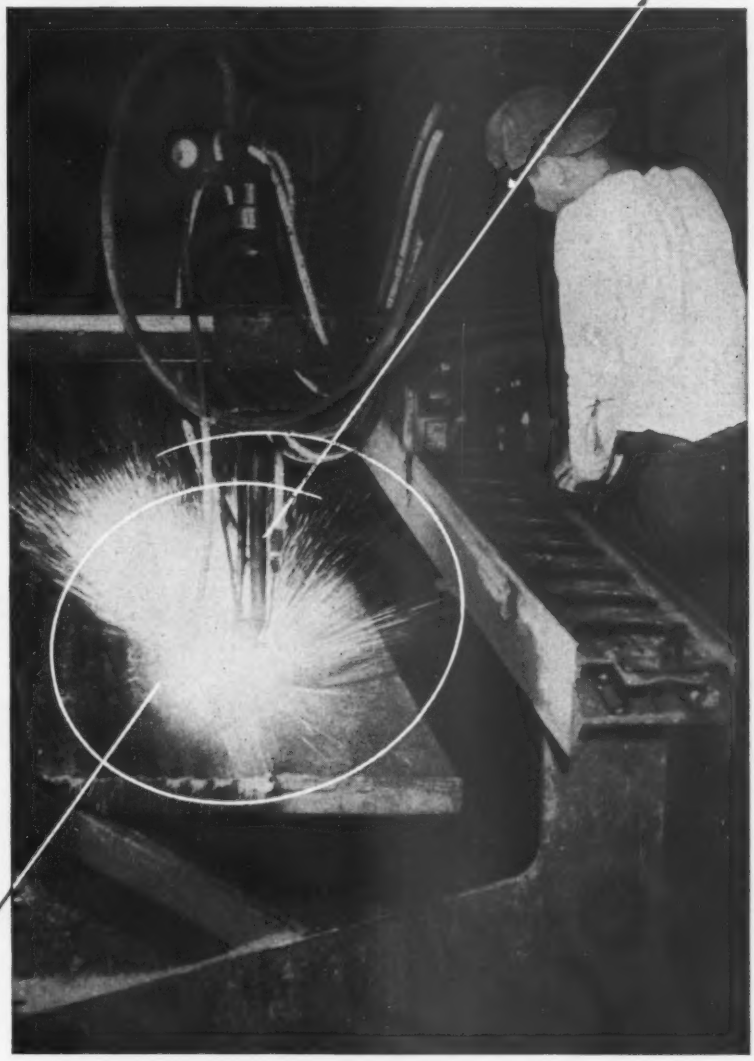
"Burning the unburnable" was the problem that faced producers of stainless steel. This steel resisted scarfing and cutting—even with the intense heat of the oxy-acetylene flame.

Doing this work by mechanical methods meant sky-high costs. But that looked like the only answer—until LINDE SERVICE took a hand with the problem.

Working in the laboratory and in the field, LINDE engineers developed powder cutting and scarfing. By adding powdered metal to the oxygen flame, stainless steel was scarfed and cut with ease and speed.



LINDE SERVICE IN ACTION! Powder cutting is saving this company alone over $700,000 per year in the production of stainless steel. And they're making a better product.

This is but one example of how LINDE customers are saving millions of dollars each year through LINDE SERVICE. If you use oxygen, let us tell you how LINDE SERVICE can save you time and money, too.

* **LINDE SERVICE** is the unique combination of research, engineering, and over 40 years of accumulated know-how that is helping LINDE customers save money and improve production in their uses of oxygen and oxy-acetylene processes.

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LINDE AIR PRODUCTS COMPANY

A Division of UNION CARBIDE AND CARBON CORPORATION

30 East 42nd Street UCC New York 17, N. Y.

In Canada: Dominion Oxygen Company, Limited, Toronto

"Hold it!"

What does he mean, "Hold it"? Anyone can see the smoke! What the firemen on the truck don't know is that an automatic sprinkler system has already extinguished the fire before the flames had a chance to spread. All that's left of the fire is the charred, smoldering remains in a container used for oily rags.

It happens every day. But so do *disastrous fires* — in factories, warehouses, stores, hotels, hospitals and schools where there is no Grinnell Automatic Sprinkler System to keep the flames from spreading.

The time to act on Grinnell Protection is *now* — before fire burns you out, or cripples your business. Grinnell Sprinklers stop fire at its source, wherever and whenever it strikes, night or day, with *automatic* certainty. Seventy-five years experience proves this.

Consider the cost of fire

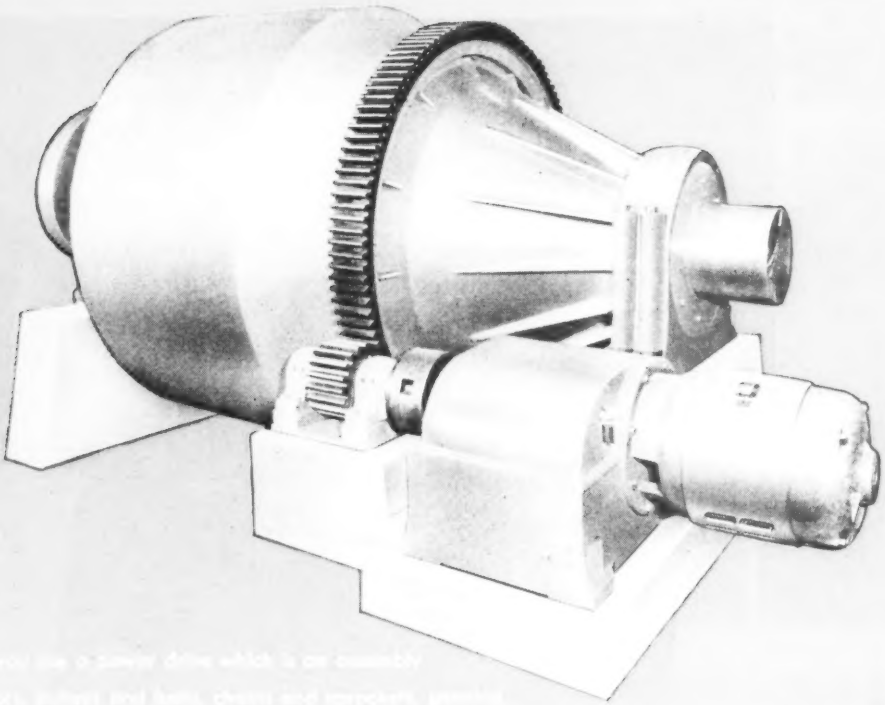
No indemnity check can take the place of hard-to-get equipment. No indemnity check can replace burned-out records. No indemnity check can bring back lost customers, or skilled workers who have strayed to other jobs.

If you have fire insurance, you're probably paying for Grinnell Fire Protection anyway. *So why not have it?* A Grinnell Sprinkler System often pays for itself in a few years through reductions in insurance premiums. Grinnell Company — manufacturing, engineering and installation of automatic sprinklers since 1878.

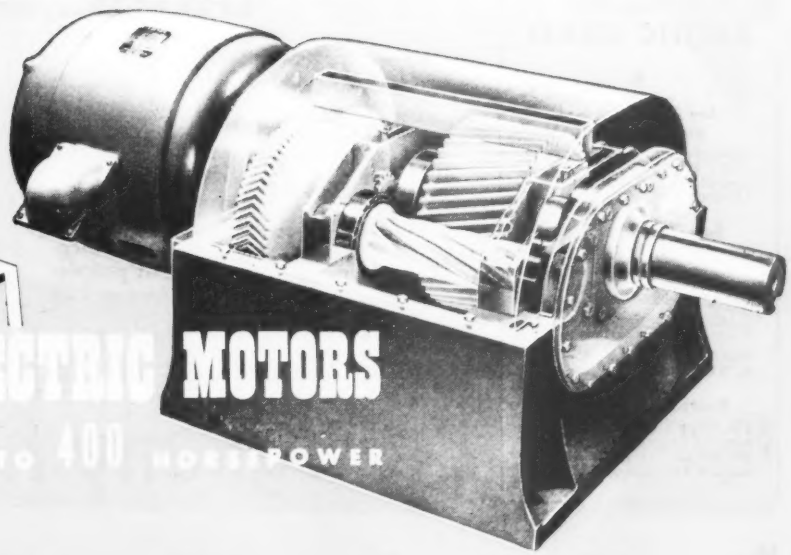
GRINNELL
FIRE PROTECTION SYSTEMS

Grinnell Company

Western Fire Protection Offices: Denver • Fresno • Los Angeles • Portland • Sacramento • San Francisco • Seattle • Spokane



best for the



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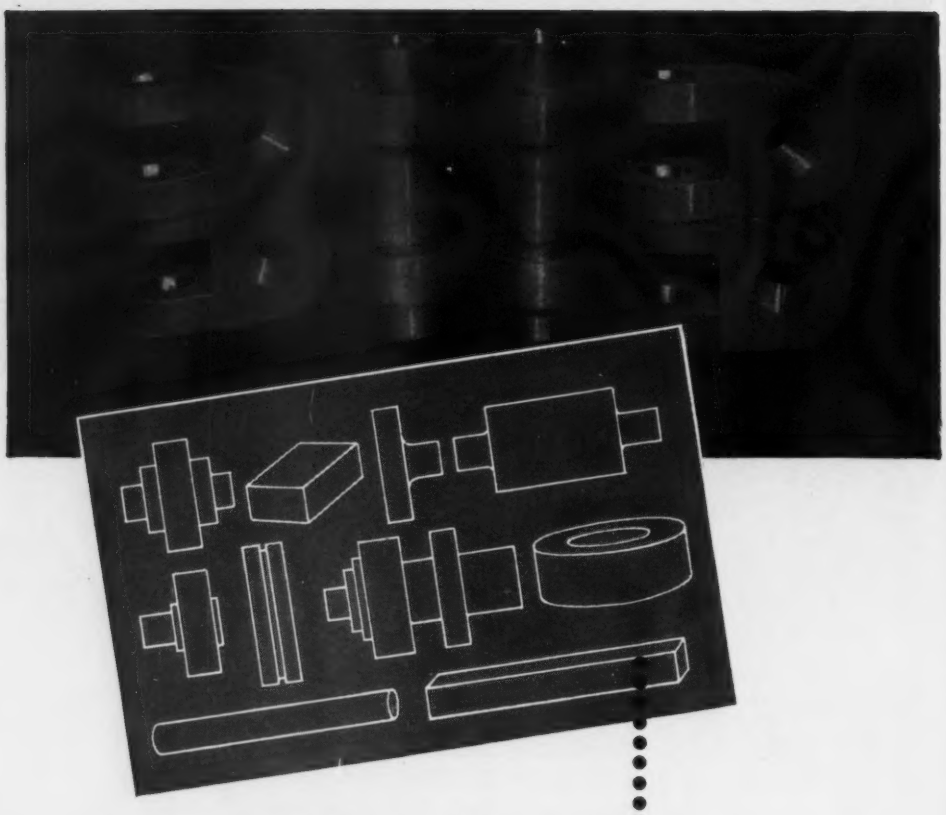

Stainless Steel Forgings

to Your Specifications

RINGS...DISCS...BLOCKS...BARS...SHAFTS

SPINDLES...HUBS...SPECIAL SHAPES

Desired forgings in the available types of stainless and heat-resisting steels are produced in a wide range of shapes and sizes by our Los Angeles plant. Experienced personnel, excellent equipment and control facilities, and substantial capacity give you assurance of quality and service.

We can supply clean stainless forgings, uniformly consistent in properties and finish, either "as forged," or rough machined, heat treated, etc. We offer assistance in grade selection, too, along with suggestions on finishing and application in order to conserve this vital material. Check with any Allegheny Ludlum representative (see list of West Coast office locations at left). ● *Allegheny Ludlum Steel Corporation, Los Angeles Forge Division, 5333 E. Slauson Avenue, Los Angeles 22, California.*

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Los Angeles Office and Warehouse

(Complete tool steel stock) 5333 E. Slauson Ave., Los Angeles 22, Calif. Phone: UNderhill 0-1181

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(Complete tool steel stock) 36 Berry St., San Francisco 7, Calif., Phone: GArfield 1-1804

Seattle Office

1927 First Ave., South, Seattle 4, Wash. Phone: MUtual 2180

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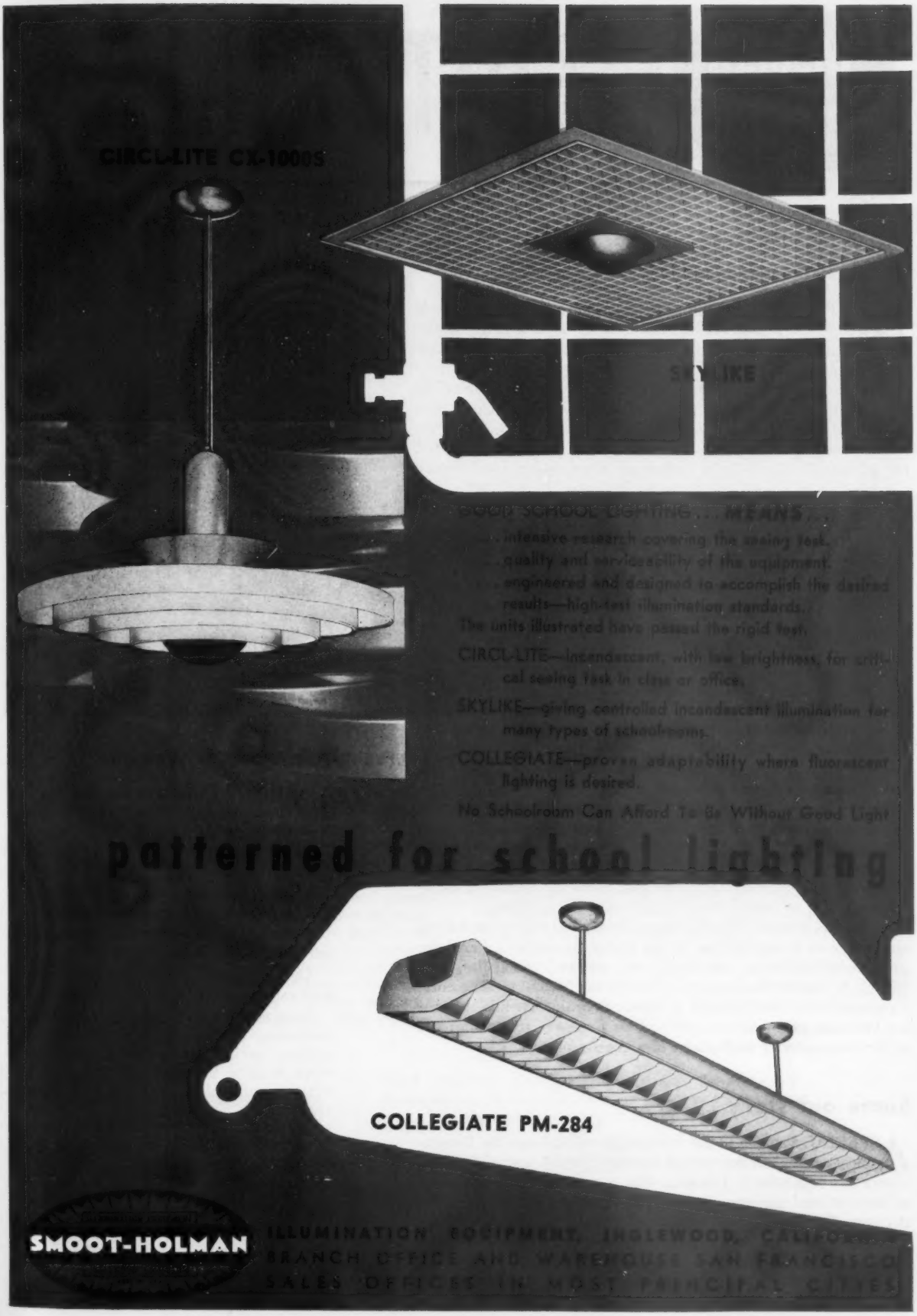
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Western Industry

EDITORIALS

Sufficient unto the day

INDUSTRIAL needs of the Pacific Northwest for more electric power should be met earlier as a result of the new policy of the Department of the Interior to let private industry have its chance to do the supplying.

This is evidenced in Secretary McKay's recent withdrawal of opposition by the Department to the Idaho Power Company's plan to build a series of three dams in the Snake River area. Under his predecessor, Oscar Chapman, the Department had contended that the company's $23,000,000 Oxbow project would prevent future construction of a $560,000,000 federal dam at Hell's Canyon, and that should the latter eventually be built it would drown out the Oxbow site.

Secretary McKay, however, said the company is ready to go ahead with privately financed construction, whereas the government has no assurance that Congress would authorize money for the Hell's Canyon project. This decision, he said, does not mean the federal government is getting out of the business of generating power for reclamation, as each case will be judged on its merits. He also announced that the decision was prompted in part by the Eisenhower administration's desire to cut expenditures.

All this seems eminently businesslike and logical. If any private power company is ready to proceed with plans for providing the area with more electricity, it should be permitted to do so, rather than delaying the Northwest's development in the uncertain hope of getting Congress to finance a federal project.

We are not overly impressed by the argument that the outcome will be piecemeal projects instead of a so-called unified plan of orderly development. Who knows whether any over-all plan as drawn up today will be the right answer 25 or 50 years hence? The over-all plan may be just a straightjacket that limits the activity of fertile minds capable of finding better solutions to the problem.

Nor are we alarmed over the alleged danger of turning our natural resources over to monopolies. In the first place, we have found the government itself to be a monopoly, or a series of monopolies, more difficult to control than private corporations. Secondly, the mental transition in the consciousness of American businessmen in the past few years has given private corporations a sense of trusteeship and public responsibility undreamed of a generation ago.

Same old story

A SPECIAL dispatch to the *Portland Oregonian* says the Department of the Interior (which includes the fish and wildlife bureaus) has suggested to Congress that it considers formulation of an international agreement to stabilize the world's expanding tuna industry. The international wheat agreement is held up as a model. Regarding the desirability of patterning after that model, John Locke, president of Fisher Flouring Mills Company of Seattle, said in a letter to *Western Industry* last October, "This was another case where the operation was successful but the patient died."

According to Webster

DID YOU EVER link together the following four definitions from Webster's New Collegiate Dictionary:

Luck: That which happens to one seemingly by chance.

Chance: Something that befalls as the result of unknown or unconsidered forces.

Accident: An event that takes place without one's foresight or expectation.

Safety: Quality of being devoid of whatever exposes one to danger or harm.

In other words, may we deduce from these definitions that study, foresight and perception, which are progressively within reach of all to the extent that they are developed and applied, eliminate luck, chance and accident? May we further deduce that safety is the natural consequence of these steps? Webster offers no evidence to the contrary.

Digging for buried treasure

In the search for faster, better ways of digging out the earth's many mineral treasures, designers of mining machines and equipment are finding OSTUCO Tubing the ideal solution to countless problems.

Drill posts, augers, conveyors, roof jacks, seam cutters, elevators, fans, power shovels, and draglines are but a few of the items that can be and are being improved by OSTUCO Tubing in the form of bits, shafts, rolls, supports, hydraulic and air cylinders, weldments, bushings, sleeves, spacers, handles, bearings and the like. Strength, rigidity, light weight, unlimited design flexibility and low cost are some of the reasons why engineers in this industry, as in practically every field, specify OSTUCO Seamless or Electric Welded Steel Tubing. They know they can count on OSTUCO for consistent highest quality, and they like the convenience of OSTUCO's Single Source Service, made possible by manufacturing, forging and fabricating all at one plant.

It will pay you to consult our experienced engineers about OSTUCO Tubing for your current needs or for redesigning your products to meet future competition.

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OSTUCO TUBING
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MODEL L
For lubricating, hydraulic, transfer, circulating, burning oils service. Built in 5 sizes.

The Tuthill Model L is the pump that introduced the first practical mechanical seal for leak-free performance and low power consumption. This compact, efficient positive displacement internal-gear rotary pump is offered in the following types to fit the pump to the need—in capacities from ⅓ to 6 g.p.m. and pressures to 600 p.s.i.

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For burning oils service. Flanged ports, 3-bolt mounting. Built in 3 sizes. Available also with built-in ball bearings as Model LDK.

MODEL LF
For lubricating service. Flange mounting without shaft seal. Choice of internal or external porting. 3 sizes.

MODEL LH
For hydraulic service. Pressures to 600 p.s.i. 4 sizes.

MODEL LK
For lubricating, hydraulic, transfer and circulating service. Built-in ball bearings. 4 sizes.

MODEL LPV
For lubricating, transfer and circulating service. Built-in adjustable by-pass valve. 3 sizes.

MODEL LSA
Stripped pump for built-in applications in lubricating, hydraulic, transfer and circulating service. Includes Model L cover, idler gear and rotor. 5 sizes.

MODEL RL
Automatic reversing feature permits driving pump in either direction without changing direction of flow or changing port positions. For lubricating and hydraulic service. 3 sizes.

Write for Catalog No. 101 on Model L pumps. Also ask for Tuthill Pump Guide on complete line of Tuthill pumps.

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939 East 95th Street, Chicago 19, Illinois
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Ingersoll, Ontario, Canada

LETTERS

Contributions to this column from our readers are welcome. Names will be withheld from publication if so requested. Unsigned letters, however, will be disregarded.

Technical help

Editor, *Western Industry:*

We would like to obtain 25 reprints each of the articles "Western Machines for Shell Molding" and "Converting Wood Scraps into Unbreakable Tableware" from the March issue.

A. L. BONUTTO
Manager, Technical Service Dept., Monsanto Chemical Co., Seattle, Wash.

By-products from gas

Editor, *Western Industry:*

I have just read the by-products article (March issue), and wish to express appreciation to you and your staff on the fine job done in presenting it. Everyone here in the engineering department now feels prouder than ever to be a member of such a progressive company.

T. B. HENSHAW
Assistant Chief Engineer, Portland Gas & Coke Co., Portland, Ore.

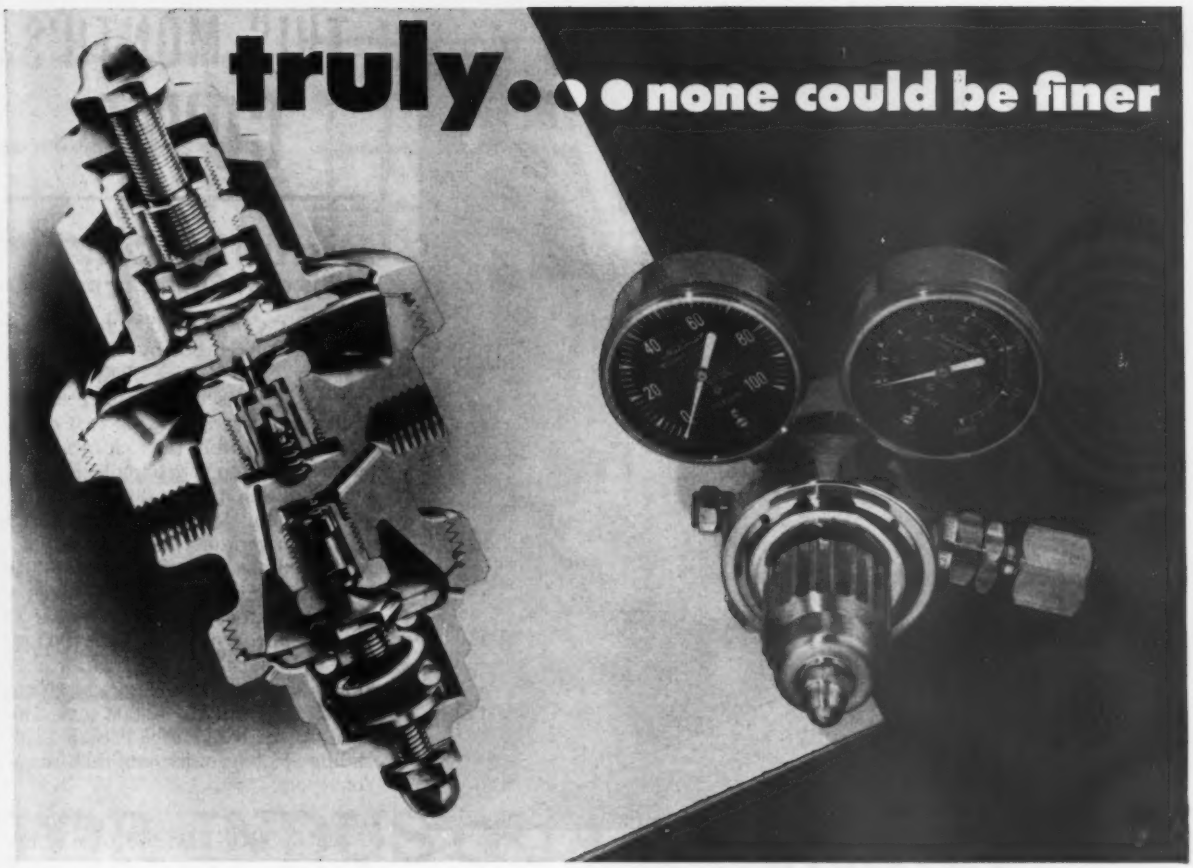
Plant design rings bell

Editor, *Western Industry:*

I have just been referred to your May issue of *Western Industry*, which contains the very interesting "Plant Design" section. There are three of us who are taking a course in Plant Layout and Control at the San Jose State College Night School to broaden our knowledge in this field. The material contained in this section would be a welcome addition to our personal libraries. I am writing to ask you if you would be so kind as to send us 3 copies of your May, 1953, issue of *Western Industry* to the address shown below and send me the bill accordingly. I will send a check by return mail upon receipt of the magazines.

C. A. CREIDER, JR.
Planning Dept., Ordnance Div., Food Machinery & Chemical Corp., San Jose, Calif.

(In addition to information on plant design the special section gave much data about air conditioning, lighting, heating, pumps and other equipment for industrial plants.)



no matter how much you spend you cannot buy finer regulators than National

AND—here is a listing of the exclusive advantages they offer you:

1. Manufactured by an organization which has been in the welding and welding equipment business for over 40 years — whose original owners and operators own and operate the company today.

2. All major parts are automatically machined from uniform bar stock which assures complete concentricity and, thereby, absolute uniformity. Nothing is rounder than a round bar — and nothing offers greater production uniformity and strength.

3. A fully sealed — nylon bearing — tension screw assembly for effortless, long lasting — silken smooth operation.

4. Self-reseating relief valves which are tamper proof, reliable and sturdy.

5. A patented feature permitting instant change from hand set to a pre-set.

6. Both high and low pressure reduction stages are pressure adjustable.

7. The nylon button takes end-friction out of the tension screw.

8. An efficient inlet filter, with renewable cartridge, is easily replaceable without total disassembly of parts or removal from regulator body.

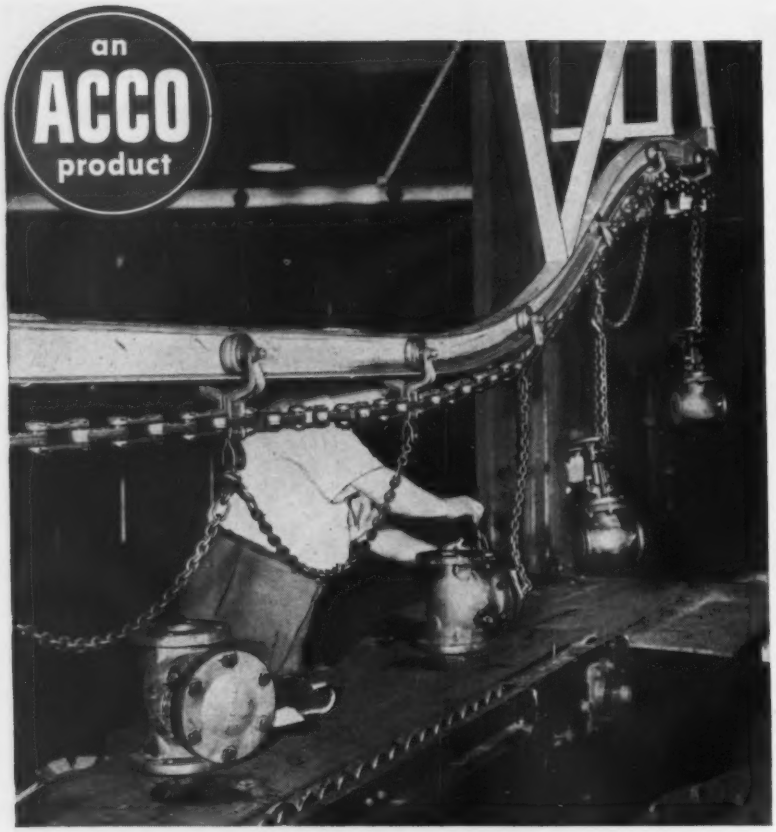
9. A seat mechanism and seat material which gives longer and more pressure accurate regulator life — which keeps the regulator on the job rather than in the repair shop.

10. Metal diaphragms which are neither too large nor too little and which have been designed for long life and freedom from trouble.

11. Short, properly designed and made tension springs which neither buckle nor bind in service.

528

Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California



How AMERICAN Chain Simplified Flow of Material

• Valves had to be moved from the testing department on the second floor to the ground level. A conveyor system could move the material but attachment of widely different sizes and shapes of valves slowed up the job.

The AMERICAN CHAIN man suggested 150 lengths of ¼" steel loading chain with No. 42 ACCO grab hooks. This light, strong, highly flexible chain permits looping through the handle, around a flange, or even through open parts of the valve. Now in a matter of seconds, any valve is securely fastened for the trip down to the lower level.

Here is a simple, effective use of chain which saved money. Perhaps you have a similar problem, or a use for one of hundreds of welded or weldless chains made by AMERICAN. Whatever your chain need, bring your problem to AMERICAN which makes America's most complete chain line.

Your AMERICAN CHAIN distributor stocks many styles and sizes, and can get any others for you. He knows chain. He can save you money. Call him today.

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THIS MONTH'S COVER

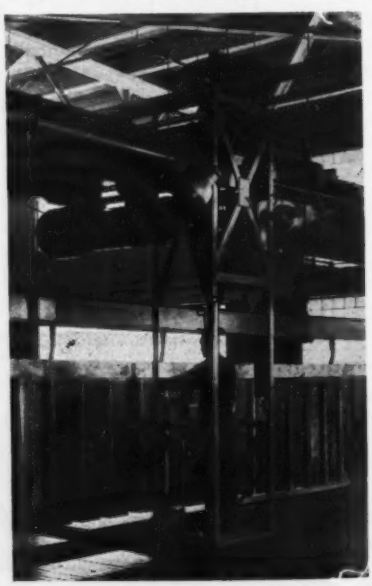
WESTERN ICE PLANT chills east-bound produce

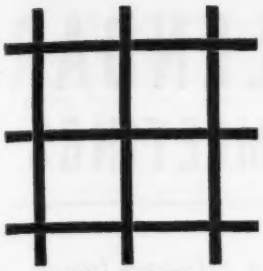
ICE TO COOL 76,000 refrigerator cars was turned out by Pacific Fruit Express' $100,000 ice plant at Laramie, Wyo., in its first year of operation. Refrigerator cars carrying vast quantities of food from the rich farmlands of the West stop here to replenish their supply of ice on their way to the East.

An icing platform allows two trains of 85 refrigerator cars each to be re-iced simultaneously. The 96 x 180-foot reinforced concrete plant contains a huge tank room where 3,744 metal cans are filled with water, each producing 300-lb. cakes of ice. Ice cakes ride a conveyor into storage rooms having a capacity of 40,000 tons. The cans are in banks of 36, each bank sliding 5½ tons of ice onto the storage conveyors.

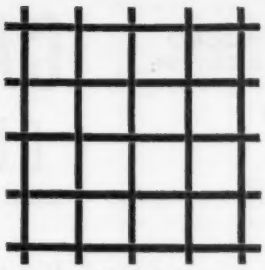
CORRECTION: On this page in the May issue the name of the architects for the Rinshed-Mason and Union Hardware buildings was incorrectly given. It should have been Albert C. Martin and Associates.

IN PFE's tank room sit 52 rows of 72 cans each. Rows are individually covered by sections of flooring, giving the room the appearance of a gymnasium. An overhead crane lifts half a row of cans to the can dump for emptying.

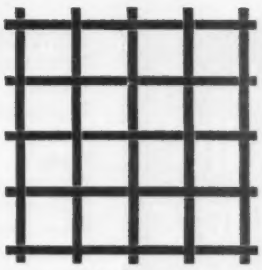




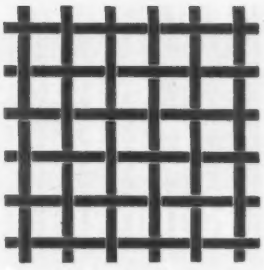
2 Mesh .063"
76.4% Open Area



3 Mesh .041"
76.7% Open Area

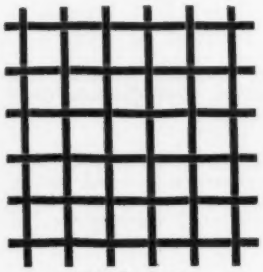


3 Mesh .054"
70.1% Open Area

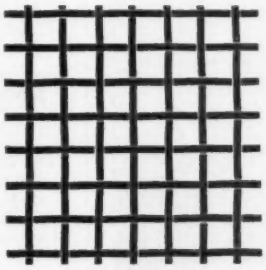


4 Mesh .063"
56.0% Open Area

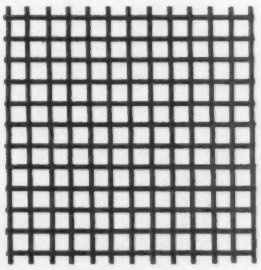
CALL CHASE



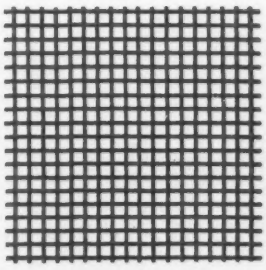
4 Mesh .047"
65.9% Open Area



5 Mesh .041"
63.2% Open Area

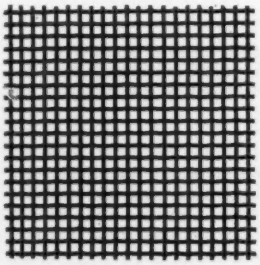


8 Mesh .028"
60.2% Open Area

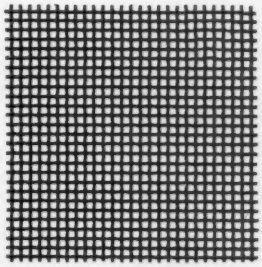


12 Mesh .023"
51.8% Open Area

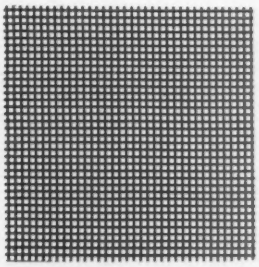
FOR INDUSTRIAL WIRE CLOTH



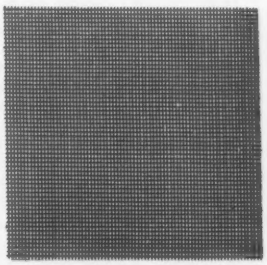
14 Mesh .020"
51.0% Open Area



18 Mesh .017"
48.3% Open Area



24 Mesh .0135"
45.8% Open Area



50 x 40 Mesh .009"
35.7% Open Area

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Double crimped wires of Chase Wire Cloth keep openings square and true . . . mesh uniform. It is woven in a mill which specializes in weaving brass, copper and copper-alloy wire cloth. The result is *quality*.

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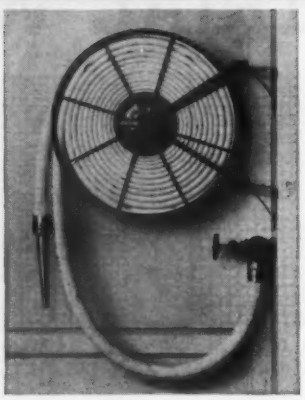

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CALENDAR OF MEETINGS

JUNE 21-JULY 3—*California Institute of Technology,* Pasadena, sixth annual conference on personnel administration and managerial development, four one-week discussions. Contact Industrial Relations Section, Cal. Tech.

JUNE 22-AUG. 1—Second annual *Institute of Business Economics* at University of Southern Calif. Contact Dean Lawrence C. Lockley of U. S. C.

JUNE 28-JULY 1—*Rocky Mountain Coal Mining Institute,* Hotel Colorado, Glenwood Springs, Colo.

JUNE 28-JULY 2—*American Society of Mechanical Engineers'* semi-annual meeting at Hotel Statler, Los Angeles. Contact Norman Lynn, 1418 N. Highland Ave., Los Angeles 28.

JULY 13-16—*Idaho Mining Association,* 50th anniversary meeting, Sun Valley. Contact Harry W. Marsh, secy., Boise, Idaho.

AUG. 2-9—*Western Conference on Apprenticeship,* Balboa Park, San Diego. Management contact Robt. C. Girard, California Metal Trades Assn., 1706 Broadway, Oakland.

AUG. 4-8—*International Association of Electrical Leagues,* San Francisco. Contact Victor W. Hartley, 601 W. Fifth St., Los Angeles 17.

AUG. 17-22—*Institute of Radio Engineers Manufacturers Assn.* and *West Coast Electronics,* regional conference and exhibit in San Francisco. Contact Mr. Heckert Parker, exhibit manager, 1980 Jefferson St., San Francisco.

AUG. 19-21—*Western Electronic Show & Convention* at Civic Auditorium, San Francisco. Contact Frank Haylock, 58 W. Poplar St., San Mateo, Calif.

AUG. 24-28—*First Western X-ray Diffraction School* at Sir Francis Drake Hotel, San Francisco. Contact North American Philips Co., Inc., 750 S. Fulton Ave., Mt. Vernon, New York, sponsor.

SEPT. 9-11—*Pacific Coast Gas Association,* at the Fairmont Hotel in San Francisco. Contact Cliff Johnstone, secretary, 447 Sutter St., San Francisco.

SEPT. 10-12—*Rocky Mountain Industrial Exposition,* Univ. of Denver Arena. Contact Harold S. Craig, exec. secretary Rocky Mt. Management Club, 1031 - 15th St., Denver.

SEPT. 13-16—*American Institute of Chemical Engineers,* national convention at the Fairmont and Mark Hopkins Hotels in San Francisco. Contact George Gester, P. O. Box 1627, Richmond, Calif.

SEPT. 21-23—*American Mining Congress,* Metal and Nonmetallic Mineral Mining Convention, Olympic Hotel, Seattle. For hotel reservations contact Housing Committee, Seattle Hotel Association, 315 Seneca St., Seattle.

OCT. 16-17—*Automotive Electric Association,* national conference, San Francisco. Contact S. W. Potter, exec. secy., 802 Michigan Bldg., Detroit 26, Mich.

OCT. 18-20—*Pacific Northwest Trade Assn.* Fall conference on water resource development, Hotel Davenport, Spokane. Contact D. C. Knapp, executive secretary, 1217 Joseph Vance Bldg., Seattle.

OCT. 20-22—*Pacific Coast Management Conference,* at the Claremont Hotel, Berkeley, Calif. For further information contact California Personnel Management Assn., 2180 Milvia St., Berkeley 4.

OCT. 22-23—*American Ceramic Society,* Western regional conference at Palace Hotel, San Francisco. Contact James Hicks, chairman, at Kaiser Aluminum & Chemical Co., Rt. 6, Box 290, San Jose, Calif.

OCT. 27-30—*California Section, American Water-Works Association,* state convention, San Francisco. Contact John C. Luthin, secy.-treas., 1113 Laurent St., Santa Cruz, Calif.

NOV. 9-10—*California Fertilizer Association,* annual convention, business sessions at Golden Bough Theatre, Carmel, and Monterey Peninsula Country Club. Headquarters hotel for session, Hotel LaPlaya, Carmel, Calif. Contact secy.

NOV. 19—*Purchasing Agents and Manufacturers District Conference,* Oakland. Contact Ken Moeller, 427 Thirteenth St., Oakland 12.

DEC. 1-2—*Northwest Mining Assn.,* regional meeting in Spokane, Wash. Contact E. C. Stephens, Peyton Bldg., Spokane 4.

DEC. 31-JAN. 3, 1954—*California & Nevada Manufacturers of Carbonated Beverages,* regional meeting, San Francisco. Contact George Culley, exec. secy., 20 S. First St., Alhambra, Calif.

1954

JAN. 7-8—*Canners League of California,* annual fruit and vegetable sample cutting, Hotel Fairmont, San Francisco. Contact Canners League, 64 Pine St., San Francisco 11.

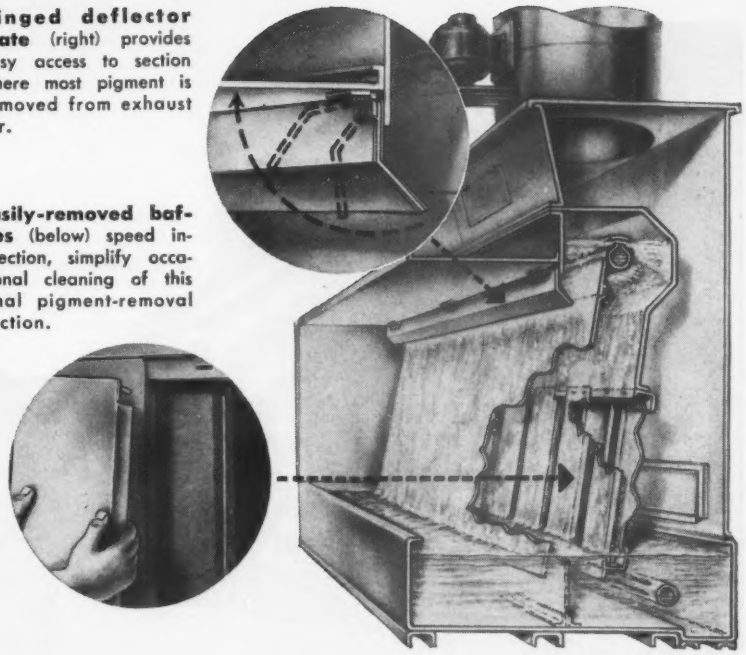
FEB. 2-5—*American Society of Sugar Beet Technologists,* eighth general meeting, Shirley Savoy Hotel, Denver. Contact Box 531, Fort Collins, Colo.

FEB. 9-13—*Western States Meat Packers Association,* regional meeting, San Francisco. Contact E. F. Forbes, president and general mgr., 604 Mission St., San Francisco.

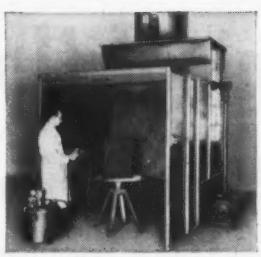
FEB. 23-28—*American Concrete Pipe Association,* national convention, San Francisco. Contact Howard Peckworth, managing director, 228 N. LaSalle St., Chicago 1, Ill.

Hinged deflector plate (right) provides easy access to section where most pigment is removed from exhaust air.

Easily-removed baffles (below) speed inspection, simplify occasional cleaning of this final pigment-removal section.



NEW Spray Booth lowers maintenance costs



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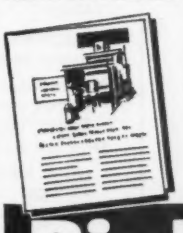

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Western Industry

JUNE 1953

IT COSTS MONEY TO SKIP PRODUCTION ENGINEERING

Go over the designer's work with a fine tooth comb and put it on a practical, economical basis

Why are manufacturers so prone to by-pass production engineering in bringing out a new item?

EITHER because they feel they are too small to have separate design engineering and production engineering departments, or they believe they can save time. More than likely the sales department has taken orders for the new item involved and top management is over-anxious to make deliveries.

Actually, separate departments are not necessary, but recognition of the distinct function of production engineering is vital. While the design engineer may also be the production engineer and equally capable in both fields, not all engineers can function in both fields successfully.

What is the first thing the production engineer will catch?

PROPER selection of materials to be used, considering saving weight, increasing strength, corrosion resistance, ease of finishing, etc.

Selection also includes the choice of standard obtainable materials instead of special materials. Variation from standard mill tolerances, widths, edges, tempers and other factors can cause trouble, increase costs or make procurement difficult.

For example, the designer often will set material tolerances not in conformity with commercial limits set by mill standards, which involves paying extra for the material and delaying delivery because of special mill runs, and, above all, precluding the use of warehouse stocks.

Designers frequently specify a size of material not carried in warehouse stock or not a regular mill standard. Right in the manufacturer's own stock there may be a size of this material close enough to make item as ordered.

In order to gain these advantages, the production engineer may, after he has studied the whole problem, find that it involves more scrap loss to make the substitution he has in mind of regular material for special. On the other hand, the extra amount of material required by the scrap loss may be far less of an expense than would be involved in sticking to the material or size specified by the designer.

J. P. HAHIR

Manager of Production Schlage Lock Company San Francisco

presented a striking picture of the relation between design engineering and production engineering at the Industrial Engineering Institute at the University of California, Berkeley, last January. The substance of his presentation is given in this article. (Mr. Hahir is not responsible for the "Mother and Son" dialogue.)

Why does the production engineer want a separate drawing made for the casting?

IN MOST cases he will have such a drawing, showing only the dimensions required for producing the casting. It should be a "must" on all castings.

First, it does not place the burden on the pattern maker of going over a complicated machine drawing to determine how much to allow for machining on any given surface. In most cases the pattern maker is not familiar with the end use of the piece or the method to be used in machining it, and the problem of allowing metal for finishing should not be left up to him. The production engineer, who has all this information, is far better qualified to determine how much metal should be allowed for machining.

Many design engineers do not think it necessary to have a separate casting drawing or do not want to be bothered

with making it. How often have we heard them say, "A casting drawing isn't necessary because the pattern maker knows where to allow for machining, because the machined surfaces are shown on the finished part drawing." We know from sad experience, however, that the pattern maker does not always allow the proper amount for machining, in some cases allowing too much and in others too little.

How often have those of us who have been up against this problem gone back to the pattern maker and complained because he had not allowed enough surface, only to hear him say, "I figured you were not going to take a cut off that surface but were going to slick it on a belt, so I didn't allow for machining. I made a similar part for Joe Doakes a while ago and he used a belt on a similar surface." Or worse yet, the pattern maker allowed 3/32 in. machining when we intended to slick the surface on a belt.

Other factors influencing the production engineer in calling for the making of a casting drawing are:

- When the part drawing is given to the foundry for casting, the only dimensions shown are those required for the actual production of the casting.
- The same holds true for the pattern maker, as neither the foundryman nor the pattern maker is confused with any of the machining dimensions.
- It is much easier for the manufacturer's inspection department to inspect the castings to a casting drawing, because there can be no controversy on the matter of machining allowances since the only dimensions being considered are those of the casting.

Sure . . . just produce it.

SON: Why is Daddy so unhappy?

MOTHER: Because he's a production engineer.

SON: But I thought you were proud of him.

MOTHER: Well really, son, it isn't quite that way. It's on account of Mr. Jones.

SON: But I thought you liked Mr. Jones. I do. He's nice.

MOTHER: Yes, sure he's nice, and I like Mrs. Jones, too. But he's a design engineer. He always wants Daddy to make something you just can't make. Right now he's got a new gadget that he's bothering Daddy about.

SON: You mean that thing Mr. Jones told Daddy he had made all by himself? Of course Daddy can make it. He can make anything. Why doesn't he just start in? Besides, I heard Mr. Jones tell Daddy that Mr. Brown said the whole world was screaming for it, and that a lot of people had already promised to buy it.

MOTHER: You don't understand, son. Mr. Brown is a sales manager and he would sell you a toy atomic bomb before it had been invented if he thought Daddy and I would promise to pay for it. Maybe he wouldn't even wait for the promise.

SON: But I heard Mr. Jones say that Daddy is way late in getting started to make that gadget. I don't see why Daddy doesn't go ahead and make it quick. I would if I were grown up.

MOTHER: It isn't just Mr. Jones and Mr. Brown. The big boss, too, wants Daddy to just look at that model Mr. Jones made and then turn out thousands like it. But Daddy knows better. He knows there will be trouble, because Mr. Jones wants a lot of things that don't make sense when you get the gadget out into the plant where all those machines and workmen are.

SON: Why don't they listen to Daddy?

MOTHER: Oh, they think they are lucky and the trouble Daddy talks about just won't happen this time. But Daddy knows they will have to make so many changes he will never catch up with his work. Besides, they will have spent so much money on the job they will feel they have to spend more money so they won't lose what they have spent already.

SON: Mama, aren't they silly? First they want to make Daddy late. Then they spend money to keep from losing what they shouldn't have spent in the first place. It's like buying a tail for a kite already smashed.

MOTHER: Yes, son, they are. Speaking of kites, Mr. Jones would probably tell you to get a special kind of string for it, but when you got to the store they wouldn't have it on the shelf. You would have to wait a long time while they sent and got it, and then it would cost you extra.

SON: I don't think I'll be a production engineer when I grow up, after all.

Why not tool up and go directly into production from design drawings?

BECAUSE it doesn't save any time. It isn't a short cut. Production delays, excessive tool costs and other hindrances will be inevitable. By the time the product is tooled and retooled and worked over many times by the trial and error method, more time is consumed than it would have taken to do the job right in the first place.

Often so many changes have to be made in the tooling and manufacturing methods that compromises are made which affect the production of the item as long as it is being manufactured. This results from trying to save the investment in tools and processes when it is inevitably realized that the job is off to a bad start.

Why can't the design engineer set the manufacturing tolerances?

BECAUSE in far too many cases he does not know enough about the manufacturing operations to understand what tolerances can be held by the operations as normally performed on various production tools and what it usually costs to hold close tolerances. Perhaps he is not sufficiently interested in the problem, or may not have time to go into the matter as thoroughly as he should.

How many times have we seen drawings with dimensions having tolerances of $\pm.001$ or $\pm.002$ on dimensions which fit the air, and which in many cases could have tolerances of $\pm.010$ or more, even in some cases of having fractional dimensions with tolerances of $\pm 1/32$?

Aren't production engineers always wanting more liberal tolerances?

DESIGN engineers can, it is true, point to instances where the broader limits requested will affect the mechanical functioning of the product. This is bound to happen occasionally, because of the difference in thinking normally existing between design engineers and production engineers. But it is the function of the latter to study things so closely that the only dimensions which can be questioned are those which are not functional and do not have to be held close.

Is it practical to follow the designer's tolerances?

ANY ITEM can be manufactured to the closest of tolerances if expense is no factor. There are machines available which will produce parts to very close limits by grinding, honing or lapping. But if the manufacturer only has turret lathes or automatic screw machines, it is obvious that no drawings calling for tolerances in tens of thousandths should be permitted to go to the production department in the expectation that such limits can be followed directly.

Why does the use of so-called standard or block tolerances give the production department trouble?

BY THIS we mean the use of previously established limits which appear in the title block of the drawing or tracing from which the prints are made. In a great many plants manufacturing the types of products we are considering, these block tolerances are on the following order:

± .005 in. on all decimal dimensions
±1/64 in. on all fractional dimensions
± 1/2 degree on angular dimensions

In addition, there may be limits set on such things as concentricity, fillets, radii and others.

Many times the designer will be working on a particular drawing and will feel that the standard block tolerances may be too broad for the function he has in mind, and believes that closer tolerances may be necessary.

Instead of taking time to analyze the problem carefully, he will very often (supposedly to save his own time) change the limits in the block tolerances from, say, the regular ±.005 to ±.002, thereby forcing the tool designer and manufacturing department to live up to extremely close tolerances on all dimensions, whereas it may be necessary to hold only a few dimensions to close limits.

The production engineer will note these things, make an analysis of the drawing, consider the available manufacturing methods and equipment, and suggest the opening up of close tolerances to wider limits where close tolerances are not necessary.

Should the designer specify "remove all burrs and sharp corners"?

VERY OFTEN it costs several times as much to remove burrs and sharp corners from a part as does the labor and material involved in making the part. Yet many of our designers will arbitrarily specify this, when it is either not necessary at all, or at the most only in one or two places.

The automobile industry is a conspicuous example of avoiding this mistake. In the passenger compartment one rarely finds any place where the customer can get cut or damage his clothing, and the same holds true for certain mechanical working parts such as gears in the transmission or differential. All such parts are carefully deburred so that no loose particles of metal will become dislodged and cause trouble. Yet elsewhere in the car these things are disregarded.

After it has been decided that it is necessary to remove burrs and sharp corners, many plants do not take any definite cognizance of the problem, but leave it up to the discretion of the foreman or the workman to find ways and means to do the removing. Recognizing the fact that this is often a costly operation, the production engineer will provide the proper methods and tooling. It is just as much an operation as any required in manufacturing the part, and should appear on the operation or route sheet just as prominently.

Why do we need production engineering on the finishing operation?

MANY products, such as door locks, require finishing operations, such as polishing, plating, painting or other surface treatment. Often the finishing cost is greater than the cost of labor and material for making the product, consequently great care must be taken in selection of materials and fabricating methods so as to insure the lowest possible finishing cost.

For example, it might require considerable study whether to use a brass casting or a brass forging. In most cases a brass sand casting would be cheaper, but after taking into consideration the machining costs of each and the loss due to defective or porous castings, the forging at a higher cost might be better. Frequently the shape of a part will add many cents to the cost of finishing, whereas a slight change in the design would lower the cost considerably.

Another factor is the trapping of cleaning and plating solutions in the parts if there are blind holes or recesses. This makes for slow handling in the plating operation, which of course in turn increases the finishing cost. The production engineer will suggest design changes so that parts will not trap solutions and will drain easily.

Can the production engineer cut down foundry rejects?

WHILE many foundry rejects are the results of bad foundry practice, most foundrymen will agree that poor design is the greatest cause. The production engineer will check the part design for the factors necessary for producing a good casting. He will consult with the foundryman and, if necessary, request changes from the design engineer.

Castings are often difficult to machine because they cannot be easily held in turret lathes, mills or other machines. The production engineer will consider this problem and add a lug or boss if desirable which often can be used as a means of accumulating slag or venting gas that might otherwise get into the casting and cause a defective casting. He will also check the machined part to make sure there is sufficient metal called for on all surfaces to be machined.

How can he save money on the tooling?

OFTEN the designed product cannot be produced efficiently on the equipment the manufacturer has in his plant. This may be due to the close limits previously mentioned, or to the fact that the equipment will not produce the items at low cost. Careful study by the production engineer will suggest the changes necessary or show the need of new equipment.

We find many thousands of dollars spent in constructing tools, jigs and fixtures, when the tools will not produce parts to the accuracy called for on the drawings. No good production engineer will knowingly permit such construction.

NEW USES FOR WESTERN COALS

Bureau of Mines blazes trail toward tar for chemicals, synthetic fuels, heat for generating electric power

RECOVERING crude tar for chemical uses and possibly synthetic fuels, as well as providing heat for generating electric power, are two utilizations of Western lignite and subbituminous coal proposed in a new U. S. Bureau of Mines report.

Experimental work has been carried on in the Bureau's laboratories and pilot plants at Denver, and a power plant employing the proposed two-stage process is being built in Milam County, Texas, by the Texas Power & Light Company, acting as design, construction and operating agents for the Aluminum Company of America. This plant will burn Texas lignite in generating power for Alcoa's new aluminum reduction unit at Rockdale, Texas.

For most Western coals

The Bureau's report, entitled "Drying and Carbonization of Fine Coal in Entrained and Fluidized State," indicates that the process techniques employed are applicable to most of the coals available in the Western States except those having coking or agglomerating properties. The Bureau has studied quite a number of different coals and finds that any coal having more than 12% oxygen in the pure coal substance or those having pure coal heating values less than 14,000 Btu. per pound can be processed successfully.

It appears likely that the main application of these processes in the near future will be in connection with power generation in large plants to produce crude tar for chemical uses and possibly for synthetic fuels. A specific application might be of interest to steam power plant operators on the West Coast.

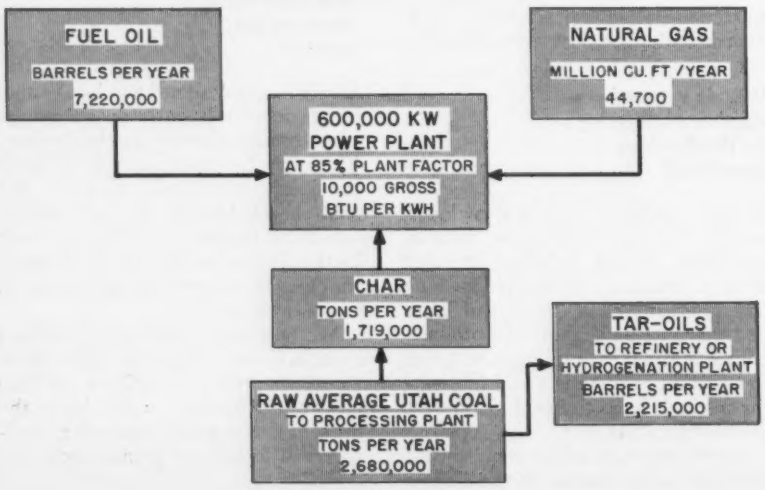
Power plant analysis

The study was made by V. F. Parry, chief of the Bureau's Coal Branch in Denver, W. S. Landers, fuel technologist, E. O. Wagner and J. B. Goodman, chemical engineers, and G. C. Lammers, chemical engineer employed by the Texas Power & Light Co.

An analysis of the fuel requirements for a 600,000-kw. power plant of a type similar to the Contra Costa or Moss Landing steam plants in California, as shown in the accompanying chart, is submitted by V. F. Parry:

"If these plants were operated at 85% plant factor each plant would require about 7,000,000 bbl. of oil or 45,000,000,000 cu. ft. of gas per year. On the other hand if they were operated on average Utah coal which was processed to remove crude tar before burning the char for power, as is planned in the new Alcoa plant at Rockdale, Texas, the coal consumption would be 2,680,000 tons per year and 2,215,000 bbl. of crude tar would be produced. The value of this tar might make the coal operation competitive with oil in the near future."

Fuel requirements for 600,000-kw. power plant using char from average Utah coal, natural gas, or fuel oil



Pilot and commercial plants

During the development research, conducted from 1949 through 1950, the Bureau designed and installed two pilot plants in Denver—one a 5-tons-a-day capacity and a larger integrated unit of 25-tons-a-day capacity, in which drying and carbonizing operations are conducted in sequence. The published report is concerned chiefly with work on the small unit, used in experimenting with Western coals.

The commercial (300,000 kw.) power plant now being built in Texas will use about 1,000 tons of lignite a day in each of nine units comprising the lignite processing part of the plant. Only the drying units will be completed by the end of this year, however. Until the carbonizer units are installed later, the power plant will be fueled with dried lignite.

In the two-stage process, fine coal or lignite is both dried and carbonized in an entrained and fluidized state. The lignite or other low-rank coal first is crushed to ¼-inch particles or smaller. To remove the moisture, the crushed fuel is entrained or mixed with hot flue gases in a fluidized dryer developed here. At a temperature of 300 deg. F., 90% to 95% of the inherent moisture in the coal is evaporated within approximately 50 sec. Then, the hot, dry fuel is moved pneumatically to a carbonizing reactor, where a portion of it is burned with air at a temperature of 950 deg. to extract the tar oils and obtain a char. This transformation can be made at an over-all efficiency of about 91%, Bureau scientists believe. They are now at work developing methods for ridding the tar oils of dust and other solid impurities.

Recording 41 measurements simultaneously . . .

exemplifies the economy of . . .

SCIENTIFIC INSTRUMENTS

By JAMES R. BRADBURN

EVEN THE AVERAGE engineer is not aware of the extent to which the instrument industry, or more specifically the scientific instrument industry, has gone in providing products of great importance to his work.

The industry today is not limited to manufacture of meters, scales and balances. It now includes combinations or systems of equipment of which meters and other components are only a part.

Instruments have a very real economic justification as tools. In design, they help to reduce costs by doing work which the engineer might otherwise have to do less efficiently.

Time savers

Again, they are tools for the engineer, helping to shorten elapsed time, permitting jobs to be completed sooner, and information to be made available in a shorter period of time. This is very important in certain operations, particularly in guided-missile work, where results must be available between test launchings. Instruments also provide information not readily available through other methods.

Instruments are used essentially for interpreting physical phenomena, whether these be mechanical motion, electrical values, or radiant energy.

Five basic use classifications can be listed as follows:

(1) *Measuring,* including analysis;

(2) *Converting,* or, a newer word, transducing, as from a mechanical to an electrical state;

(3) *Indicating,* a meter which measure, for instance, also indicates value which it has measured;

(4) *Recording* engineering data, as in the pen-and-ink recorder, or recording oscillograph;

(5) *Controlling,* including computing.

In the last analysis, instruments provide numbers for the engineer, because engineers operate with numbers and use them in their calculations. It is important to consider why they do so. An oft repeated statement by Lord Kelvin is:

> "I often say that when you can measure what you are speaking about and express it in numbers you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind. It may be the beginning of knowledge; but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be."

A good example of applied instrumentation is aircraft flight studies involving everything from simple to sophisticated use of instrument systems in the analysis of a structure under stress. A myriad of measurements must be made, both external and internal, of the power plant as well as of the structure, of pressure and strain, vibration, temperature, acceleration, and other physical phenomena.

But it is not sufficient simply to measure what is going on; the measurements must be recorded so the engineer can later study what has taken place, and someone or some further process must use the data supplied by the instruments and reduce it to an engineering conclusion.

Another consideration in the evaluation of engineering information is inter-relation. In many cases, information of a simultaneous nature is needed. There is a complete interdependence of all phenomena affecting or occurring in a structure such as an

BY RECORDINGS in above instrument shack, Douglas cut refueling C-124A Globemasters from 4 hr. to 18 min.

aircraft. Engineers need to know, for instance, what is happening when the pilot pulls back the rudder stick, what happens to the wing structure, what happens to the power plant . . . in general, what is happening *at the same instant of time* in various parts of the ship. Therefore, instrumentation must provide a common time correlation for simultaneous analysis of data.

Many recording methods

Photographic cameras can cover a bank of standard meters, such as on the instrument panel or another set of instruments established for the particular measurements involved. A good time correlation is given; that is, one is able to see all of the instruments being recorded at the same instant of time. However, most instruments which are used for such purposes have a slow time response, and therefore the type of measurements which can be made is limited.

Fortunately, there are many other methods of recording more dynamic information. Among these are pen-and-ink chart recording, recording oscillographs, magnetic tape recorders, cathode ray, and photographic recorders. These record information at a higher rate of speed; that is, information which is changing more rapidly.

In order to record information at all, some basic transducers, or primary sensing devices are needed. A transducer, in the dictionary definition, is a device which transduces, i.e., changes information from one state of energy into another. Examples are the common strain gauge, an accelerometer, a vibration pickup, pressure pickup, thermocouple, position sensor.

A complete dynamic recording system must consist, then, of a sensor or transducer, in some cases an amplifier to amplify this, and finally the recorder. In such a system, many channels of information can be handled simultaneously.

JAMES R. BRADBURN
Vice President
Consolidated Engineering Corporation
Pasadena, California

In large aircraft, however, and even in some smaller ones, where a great number of individual bits of information must be recorded simultaneously, it is necessary to handle a large number of channels, and while recording oscillographs, for instance, commonly contain 18 or more changes, frequently this is not enough.

Too much data

This can be overcome by adding more oscillographs, more channels of amplifiers, etc., but frequently information does not change rapidly enough to require the full dynamic recording treatment. Consequently, different channels of information can share the time by being recorded in sequence.

Dynamic recording systems referred to so far are usually carried in aircraft when the ship itself is large enough to support the mass of equipment. In other cases, particularly with guided missiles, where the missile itself cannot be recovered, the information is sensed on the missile or aircraft by means of basic transducers and then is telemetered—i.e., radioed—to the ground control stations. It is at the ground control station that the recording equipment as well as the data reduction equipment is located.

One of the surprising shortcomings of most such systems, however, is that they provide too much data. Consequently, it is necessary, to save time of the engineer, to devise automatic data or information handling systems. These take the recorded information and change it into a form more useful to the engineer in working out his problems of stress, and other design problems.

One of the first problems encountered in a data or information handling system is analog-to-digital conversion. The reason for changing over from analog information to digital information, as soon as possible, is to gain accuracy. As mentioned, the engineer wants numbers to work with, and consequently numbers, which are digits, provide an accurate means for him to handle his information.

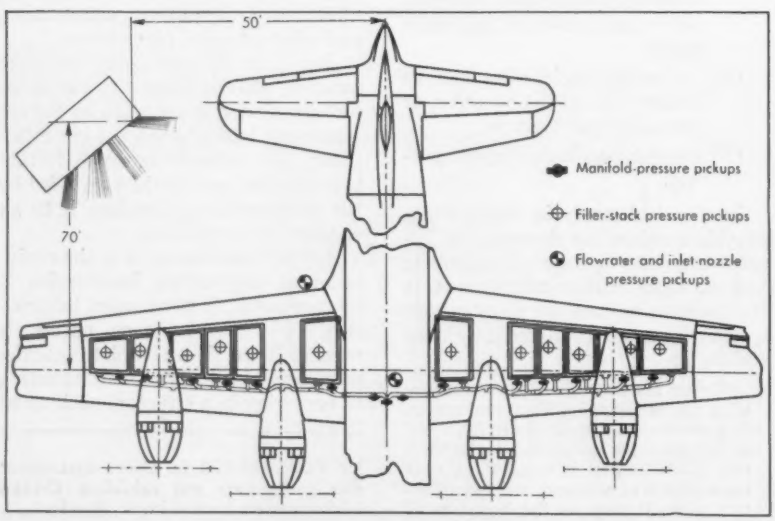
Many analog-to-digital conversion methods have been devised and are already being provided to fulfill this requirement. Once the information is in digital form, it can again be stored easily on magnetic tape, ready to play back for the other more obvious requirements of tabulation, automatic plotting, and computation.

Shortcuts possible

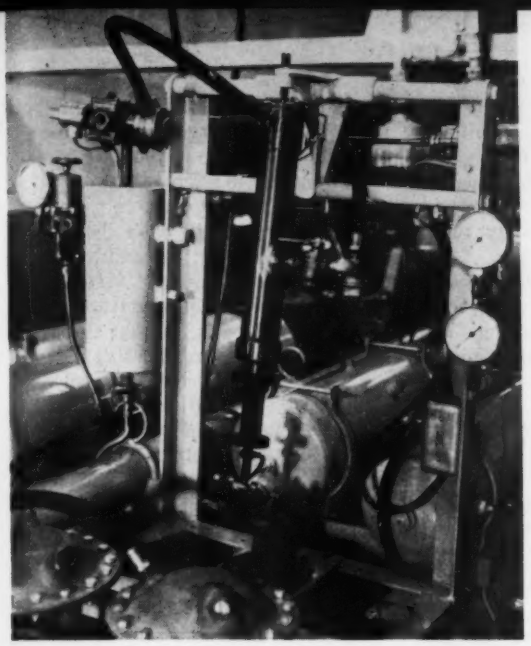
In some applications it is not necessary to record any data in analog form. Information passes directly from the sensing devices or transducers through analog-to-digital converters to tabulators, plotters, or automatic card punches directly as it is secured. An example is a recent installation of equipment in an aircraft wind tunnel, where models are set up in the tunnel with strain gauges, readings taken automatically and the readings then converted to digits at the time of their occurrence.

In this instance there is sufficient time between runs to convert information into digital form for further analysis. The exact setup includes a number of strain gauges mounted on the model and connected to wires leading into an analog-to-digital converter, which provides digits for punching into IBM cards. The IBM cards then became the basis for further computations, particularly scale factoring and automatic tabulation of the basic information from the wind tunnel model.

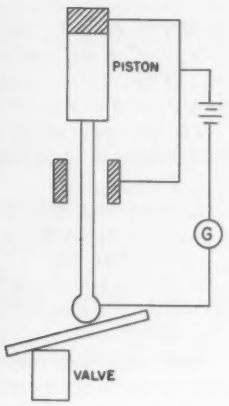
Of course, there are many separate systems of varying complexity. To provide simple measurements requires less complicated equipment. An example



PRESSURE STUDIES at critical points, measurement of important transient pressure surges, gauging of fuel available to engines included in Douglas tests. Drawing shows pickups, shack position.



HOW TO STOP a truck in 6 seconds figured out by Bendix-Westinghouse in this test. Air-operated mechanical foot actuates the brake system and produces "hunch marks" on the record for time reference. Two brake chambers, in foreground.



of this can be found in the equipment for the simple yet profound measurements made at California Institute of Technology, where metal specimens are rapidly loaded in order to determine the rate at which plastic deformation takes place under conditions of both sudden and continual load.

In many of the simpler systems for general industrial use, only a few channels are required, and frequently slower speed information; that is, information under 50 cycles per second is required. Such installations do not require elaborate equipment, by and large, and such devices as pen-and-ink recorders are quite suitable.

Unfortunately, the using engineer frequently gets in the position where he starts out with the simpler equipment, but soon runs into a problem which requires instrumentation of higher response and a greater sensitivity than he has on hand. This just cannot be helped, for future needs are often impossible to predict.

Chemical analysis field

There are many other industrial uses of instruments besides the information or data processing systems already mentioned. There is the field of chemical analysis. Here we find a whole host of instruments which have been developed for this work. Some of these are highly complicated, large instruments, such as spectro-photometers, infra-red analyzers, mass spectrometers, all devices which work on some physical characteristic of the material being analyzed for its chemical constituents.

The chemical industry has gone a long way in the employment of instruments for its nearly automatic operations. Large refineries today are controlled largely by instrumentation, and work is being done continually to carry processes further and further toward completely automatic operation. This involves use of feed-back of the information from analytical instruments.

Automatic computation

An example is the use of one analytical instrument, the mass spectrometer, whose output has been in the form of a recording oscillograph chart. Today, analog-to-digital converters are being used with mass spectrometers and with spectro-photometers, with infra-red analyzers, etc., to convert their output into digital form so that one can use the numbers immediately for further calculations, for punching into cards, and so that automatic computation can be used to eliminate laborious hand computation of one type or another.

There will undoubtedly be a great expansion in the use of instrumentation in this field of control. Literature today is full of examples of how instruments are being used in a wide variety of situations never thought possible.

Future outlook

By and large, requirements on the instrument manufacturers are for low-quantity production, if meter and component manufacturing are excluded, and the great majority of instrument companies are small organizations. Since the design problem is paramount, an instrument company is required to spend a large amount of money for development and engineering. This has been helped to a considerable extent in recent years by government development programs.

As time goes on, however, sales engineering is becoming more important and pressing because more people are requiring instruments, learning about them and looking to see what instruments can do for them. This should have a good effect in the long run on instrument prices, which will come down as the market broadens.

Many companies have come into being as the result of a single Government development contract, and frequently offer for sale the particular instrument developed under such a contract. If these companies are then wise enough to broaden their line and add other instruments as time goes on, they will be a positive factor in the industry. An instrument company is dependent to a large extent on how well it selects its projects for development, i.e., how well it decides what instrument it will be selling in the future.

"INSTRUMENT PARK." Artist's conception of the precision instrument manufacturing center which Consolidated Engineering proposes to establish on a 20-acre site in Pasadena.

Plant teams compete against their own— SAFETY RECORDS

DEPARTMENTAL teams competing against their own previous safety records is the method used at the B. F. Goodrich Rubber plant in Los Angeles which has resulted in a one million man-hour safety record since July 25 last year.

Wade C. Ruble, personnel manager, who is director of plant safety campaigns, provides the following facts:

The six teams which compete in the continuing safety contests are:

1. Engineering
2. Processing and Technical
3. Stock Preparation
4. Tire Building
5. Curing and Final Finish
6. Shipping and Fuel Cells and Tubes

These units were selected and paired after a careful six-month check of dispensary records to determine the number of injuries sustained during that period by personnel in each plant department. The period was January to July.

First contest set up

Then, with this as a base average (and the assurance that teams were properly matched for direct competition without having to set up a handicap system) the first six-team contest was set up for the following July through December period.

Team standings during the contest period are based on the per cent decline or increase in dispensary visits by each team against the previous six-month base period. Figures are cumulative month to month until the full six months are complete.

Each six-month contest is judged against the previous six months, with that total representing 100 per cent or "par." The contest, on this basis, is endless, and each team continually competes with its own previous six-month record, as well as against the other five teams. Quota each time is the previous six-month total, whether it was high or low in the number of sustained injuries.

During each contest period, penalty points are logged against each team on a day-to-day basis. This way each team knows constantly where it stands and can better its position by "talking up" safety and urging everyone on the team to exercise all safety measures—and thus try to improve team standing before the contest ends.

The foremen in each department (within each team) are shown to have a numerical standing as the safety performance of their people rises or falls.

It should be noted that the above described method of selecting and pairing the teams was determined most practical at the B. F. Goodrich Los Angeles plant after other team-selection methods were tried and found less practical. Other methods tried were:

1. Basis of population alone.
2. Exposure (to injury) man-hours worked.

Neither of these was judged satisfactory, even with a handicap system. However, under the present method, the population is fairly equal in each of the present six competing teams.

According to Mr. Ruble: "We have tried many different ways to promote safety. Word contests, safety slogan contests, and such, have been used but most successful is the contest or plan in which *every* employee participates.

"As a rule those who do not take part in voluntary contests are those who are most careless and need to be made safety conscious. The involuntary contest, where everyone automatically competes, whether he chooses to or not, proves most worthwhile, valuable and profitable. Such contests, we have found, benefit the employees and the management group alike.

Frequent reminding

"We have never yet seen anyone in our plant who purposely wanted to get hurt, but since we are dealing with the human element, we know that some persons will be kept less subject to injury if reminded frequently by others who are more conscientious. Safety contests help in that way."

Here is a plan that could be applied to almost any type of industry that lends itself to being broken down into separate departments. An endless contest that has participation of all employees against their own records is both efficient and inexpensive.

Penalty points

Team	Penalty Points 1/1/53 thru 3/15/53	Quota for Jan. thru March 1953	% Used	Team Standing	Previous Week's Standing
Engineering	47	48	98%	6th	6th
Processing and Technical	26	33	79%	4th	4th
Stock and Preparation	34	48	70%	1st	1st
Tire Building	56	63	88%	5th	5th
Curing and Final Finish	42	54	78%	3rd	3rd
Shipping, Fuel Cells and Tubes	7	9	77%	2nd	2nd

VERTICAL TURBINE PUMP SERVICING POINTERS

What to do about lubrication, bearings, gear replacements, sand troubles, electrolytic action

By B. A. TUCKER, General Sales Manager, Peerless Pump Division, Food Machinery & Chemical Corp., Los Angeles

THE SECOND of two articles on pump maintenance (first installment dealt with centrifugal pumps).

SOME of the difficulties encountered in the care of centrifugal pumps were discussed in the preceding article on centrifugal pumps and some suggestions of diagnosis and cure were made. Some of those problems are also applicable to vertical deep-well turbine pumps.

If repetition occurs in this article, it merely emphasizes importance of the difficulty and solution.

We shall begin with the driver or driving element of the vertical deep-well turbine pump. The greatest percentage of these units are driven by vertical hollowshaft motors. These motors are equipped with ball bearings, oil lubricated.

Keep correct oil level

The principal care is to be sure that the oil level is kept at the proper point, that the oil is clean, and that no dirt is allowed to enter the oil container. With this precaution, there will be little difficulty with bearings unless they are overloaded.

It is not uncommon for the water table in a deep well to lower to the point where it requires additional load on the motor to pump the proper amount of water required by the customer. This sometimes overloads the bearings in the motor. Where that occurs, the bearings should be enlarged to take care of the additional load, which is normally thrust load because of the additional weight of the water and the additional pumping head or pressure required of the unit.

Electric motors sometimes fail because of the change in power supply, loose connections or some such other factor. In any case of that sort, a motor service expert should be called in.

Sometimes the pump is driven by either V-belt or flat belt. The bearing construction supporting the pulley is somewhat similar to the bearing construction in the vertical hollowshaft motor. These bearings are oil lubricated, and the same care should be used as with a motor to see that the proper amount of clean lubricant is used and that no dirt enters the ball bearing container.

In the case of failure or replacement, the ball bearings have numbers on them, which identify the size and usually the manufacturer. They can be gotten in most industrial centers.

Some units are driven with right angle gear drives which are also ball bearing equipped. In addition to the bearings supporting the vertical or thrust load of the pump, there is also a radial bearing which supports the shaft connected to the engine or other motive power.

These bearings are all oil lubricated and the same care as stated above should be used to see that they are furnished with the proper amount of clean lubricant and that the oil reservoirs are kept free from dirt.

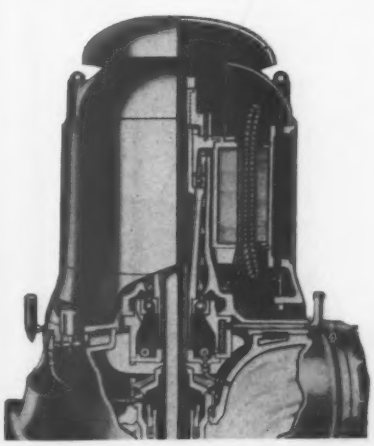
The oil in the ball bearing housing and in the gear housing should be changed every 500 hours of operation, or at the end of each year's operation if the gear drive is only used a part of the time.

Most gear drives are equipped with water circulating coils inside of the gear housing. The object is to circulate cold water through this coil to lower the temperature of the oil in the housing. Should these coils become plugged or clogged, the circulation will be inoperative and the temperature of the oil will go up, thus endangering both the gears and the bearings. The circulating coils should be kept open and cold water going through them at all times.

Replace gears in sets

Inasmuch as the gears are matched, it is not feasible or pracical to replace one gear and not the other. They should be replaced in sets, and make sure that the new set is in proper mesh to minimize noise. These gears are lapped in at the factory, and when properly installed should give long life with little noise. In most cases, the replacement of a set of gears should be done by only thoroughly experienced mechanics.

The drive, either vertical electric motor, belt or right angle gear, contains a thrust bearing which carries the entire thrust load of the pump. Noisy bearings indicate beginning of failure.



VERTICAL TURBINE pumps are oil lubricated and designed so that no oil can escape to contaminate the water. This positive means of lubrication creates a mist of oil, guaranteeing perfect lubrication of all bearings.

Should a ball in one of the bearings become chipped, it will cause excess heat and noise.

Usually there is ample warning before the bearing completely fails. If noise is detected, then the operator should immediately begin an investigation to discover the cause of the noise and if it is in the ball bearing, he should prepare to shut down the pump and make replacement.

Sand danger

Now, let's go down to the pump unit proper, which is down in the water in the well. There is no way to lubricate the pump unit proper except by the water being pumped. Most wells furnish some sand, and sand is the most destructive element in deep-well pumping. Sand not alone cuts out bearings, but it also cuts out the skirts of impellers and the vanes in the bowls, thereby lowering the capacity of the pump. If this occurs, there is only one of two things to do.

a. Remove the pump from the well and install wearing rings, either on the skirts of the impeller or in the eye of the bowl.

b. Replace the complete unit with a new pumping element.

Should the repair program be selected as the one proper to pursue, then, in addition to the wearing rings, it is usually necessary to put in a new pump shaft and new bearings through the bowls. Even with this repair, it is hardly probable that the repaired pump will be as efficient as when originally installed, but it may do a good enough job to justify such expense.

Sometimes there is a chemical in the water which sets up an electrolytic action between the impellers and the shaft, or impellers and the bowls, thus causing damage to the pump unit. This is difficult to determine without removing the pump from the well. It is also difficult for the average layman to recognize the damage of such action. It is usually shown by pitting in the steel shaft and in some cases, it removes the carbon from the iron.

The correction for this difficulty is to install the pump made of all iron bowls and all iron impellers with a stainless steel shaft, or all bronze bowls and all bronze impellers with a stainless steel shaft.

Should the pumping capacity be reduced, it may be caused either by a lowering of the pumping level in the well, by entrained air (air being carried down from the perforation in the well to the water level in the well), or because the pump is worn. The exact cause can be rather easily determined, because if it is air the bubbles will show in the discharge of the pump. If the difficulty is lowering water level in the well, that can be determined by measurement. If both these things show negative, then the only other answer is wear on the bowls and impellers, and in that case they will have to be replaced or repaired.

Pump shaft bearings

Between the pumping element proper, and the drive at the top of the ground, there is a long shaft. In some types of pumps this shaft is furnished with rubber bearings and is water lubricated from top to bottom. In such cases, the shaft usually has stainless steel sleeves where the shaft goes through the bearing. The bearing depends upon the water being pumped for its lubrication.

Because these rubber bearings are soft rubber, the sand is more apt to wear the stainless steel sleeves than it is for the bearing itself to be worn. Pumping water containing sand will eventually wear one or the other, or both, sufficiently to require replacement. Most types of rubber bearings can be replaced by merely removing the cap from the top of the bearing, pulling out the rubber bushing and inserting new bushing. Some types of shaft sleeves are also replaceable, but this is usually a factory repair job rather than the average repair shop.

The procedure to follow in the replacement of shaft sleeves would depend entirely on the type of sleeve, and the manufacturers of the particular pump should be contacted to obtain the best procedure to follow.

Oil lubricated pumps

Pumps designed for oil lubrication of the line shaft bearings have the drive shaft enclosed in a tube or housing commonly called shaft housing. This housing is usually in five-foot lengths and each piece is threaded on the inside so that the pieces may be coupled with bronze couplings which serve as line shaft bearings.

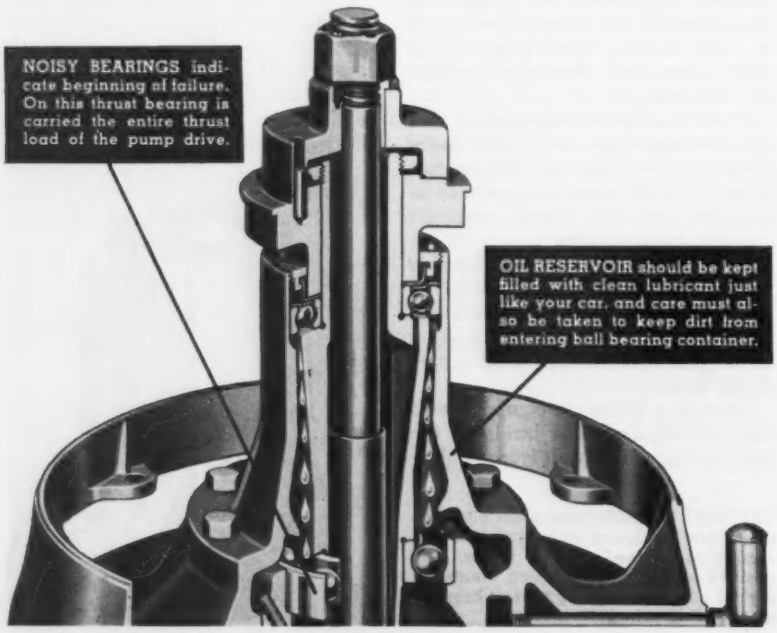
In most designs, these bearings are grooved to permit the easy flow of oil from bearing to bearing. Use of the enclosing tube, if all of the joints are tight, prevents the water being pumped from the well entering the housing, thus damaging the bearing.

If one of the bearings breaks, however, and if one of the joints becomes loose, thus permitting water to enter into the shaft housing, damage will occur to these bearings. The oil is admitted at the top of the tube around the shaft above the discharge outlet in the pump head. If the bearings become worn, the pump can be removed from the well, the bearings taken out of the shaft housing and replaced with new bearings.

Shaft replacement

If this occurs, it is usually necessary to replace the shafting, or if the shafting is not too badly rusted, or pitted, it might be reversed end per end, thus restoring the pump for good service. If the shafting is badly pitted, or rusted then new shafting should be used.

When installing or servicing a vertical deepwell turbine pump, due care should also be used to see that all joints, all threads, and all couplings are thoroughly cleaned before assem-


NOISY BEARINGS indicate beginning of failure. On this thrust bearing is carried the entire thrust load of the pump drive.
OIL RESERVOIR should be kept filled with clean lubricant just like your car, and care must also be taken to keep dirt from entering ball bearing container.

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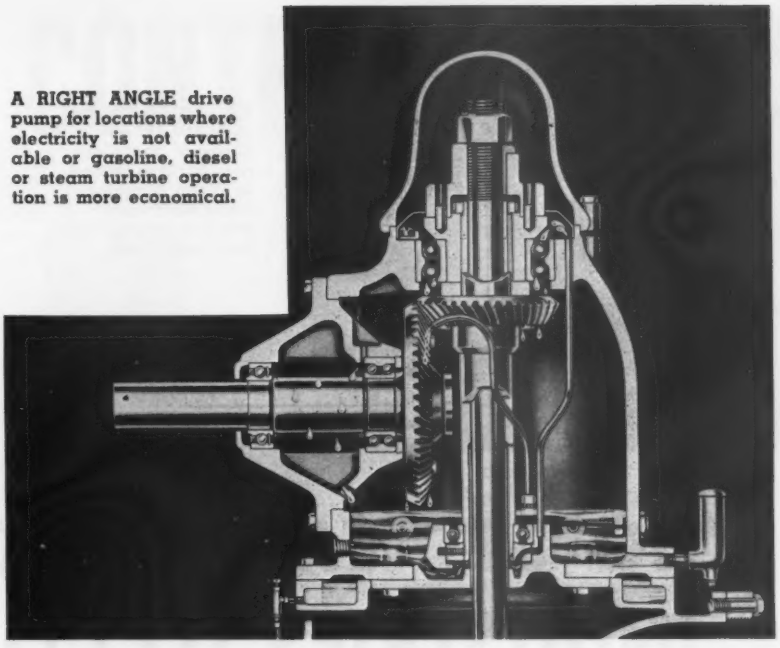
bling. Dirt is the greatest enemy to successful pump operation. The expression "cleanliness is next to Godliness" could be paraphrased and applied to the pump industry by saying "cleanliness assures perfection in operation."

When a pump is removed from the well, all exposed threads should be wrapped with burlap or other protective material to prevent sand or dirt from getting into the threads. Pipe couplings, shaft couplings and oil tube threads should also have ample protection against dirt.

Few quick failures

Very few pumps fail completely and quickly. When difficulty is occurring, there is usually ample warning. If a pump has been running smoothly, and suddenly begins to vibrate, investigation may reveal change in pumping level, impellers dragging or other mechanical failure. The operator should immediately make investigations to determine why the vibration has occurred, or is occurring, and take proper steps to correct it.

If the pump has been operating quietly for a period of time, and then suddenly becomes noisy, the operator should immediately investigate to see whether or not the ball bearings in the drive are beginning to deteriorate, or if they have become overloaded and are beginning to fatigue because of the overload. Preparation can be made for shut-down time to do repairs when ample warning is given.



A RIGHT ANGLE drive pump for locations where electricity is not available or gasoline, diesel or steam turbine operation is more economical.

Any change in this type of operation should point up to the operator to examine all phases of the operation to see that the pump is being properly lubricated, that the power being applied to the pump has not been changed and that the general pumping conditions are remaining constant; or if they have changed, to see whether or not the pump should be revamped to fit the new conditions. It is not uncommon for pumps in agricultural service to receive almost no attention, and it is amazing how long they last under such circumstances. In industrial application, where there is an operator at hand practically all of the time, the pumps get much better attention, and usually last much longer with considerably less upkeep.

If you want trouble-free operation, buy the pump from a reputable manufacturer and then take care of it as you would any other expensive machinery.

"WESTERN INDUSTRY" WINS PRIZE

"Outstanding service to industry" for best series of articles in the West

FOR ITS series of articles on industrial plant design and construction, *Western Industry* won a first place plaque for "outstanding service to industry" in the fifth annual Awards of Merit Contest of the Western Society of Business Publications. This is the first year that *Western Industry* has entered this contest.

The series of articles on plant design and construction began in April 1951 and were continued through 1952. Additional articles will appear later this year in *Western Industry*.

They have been published because the rapid growth of industry in the West confronts nearly every company sooner or later with the problem of building a new plant. The series attracted favorable attention and comment at the recent Institute on Industrial Plant Design at Los Angeles. A full report on this institute, the first of its kind in the West, appeared in the May issue of *Western Industry*.

Harry Simonson (left), president of the Society, presents plaque to A. C. Prendergast (right), the editor of Western Industry.

Western Industry's older brother, *Western Construction*, pioneer magazine of the three papers in the King Publications group (*Implement Record* is the third in the trio), won a special award certificate in the grand prize classification, for "the publication doing the best over-all job throughout 1952 in behalf of its readers, its advertisers and the industry it serves." This was also *Western Construction's* first appearance in the annual contest.

AN EXAMPLE of the so-called "clean industrials" that Colorado Springs landed is White Manufacturing Company, which is turning out floral racks (left).

What they want to know

LOCATION processes of 116 new firms in Colorado and Utah were analyzed by the author in a study which led to the preparation of this article.

The common denominator seems to be interest in factual information about sites and buildings available, railroad sidings, labor force, community history in labor relations, competitors in the area, public utility services, schools and other cultural institutions.

"GO GET 'EM" POLICY BRINGS INDUSTRIES TO COLORADO

Colorado Springs, Pueblo and Boulder are conspicuously successful examples of community effort

By
DR. JOHN D. GARWOOD
Associate Professor of Economics
Fort Hays Kansas State College

A TREMENDOUS challenge in attempting to attract new industries to Colorado has been faced by the chambers of commerce of that state. Sparseness of population in the eight Mountain states has been a deterring rather than an orienting factor in the area, as far as markets are concerned, and the presence of most of the minerals needed in modern manufacture has not proved to be a magnet as yet.

Favorable factors

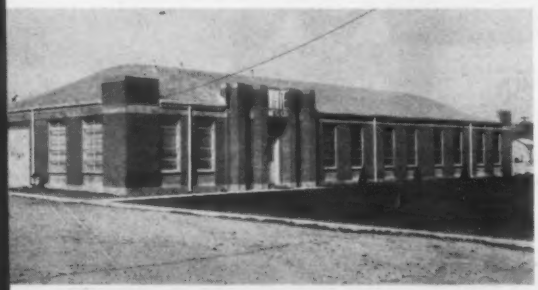
On the other hand the area has had to offer climate, a legacy of buildings and equipment from World War II army installations, a relatively non-unionized labor force, and well-kept, attractive communities.

Many of the cities in the state have engaged in prodigious efforts to "sell" their respective communities to migrant footloose firms, i.e., firms which are not tightly bound to markets or materials in their location, and Colorado Springs stands head and shoulders above all other cities in the state in its efforts in this respect.

World War II brought Camp Carson and tens of thousands of G.I.'s to the Springs. From March 1941-September 1942 the military spent in the neighborhood of $72,000,000 in the Colorado Springs region. It was at this time that the high priests of industry and commerce here decided that postwar years must also be fruitful for residents of the city. A committee was formed with the Chamber of Commerce as spokesman to bring in new firms.

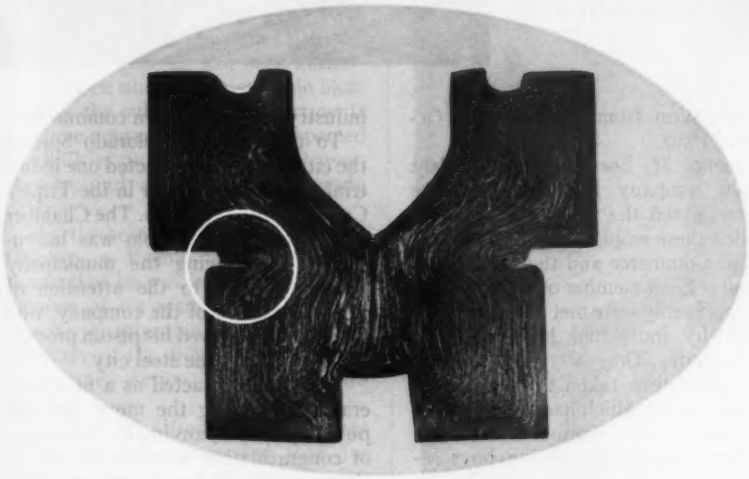
Non-support

Surprisingly enough, such a plan had less than complete community support. There were those to whom employment and sales mattered little in comparison with keeping tempo and appearance of the town at the same keel. Some busi-



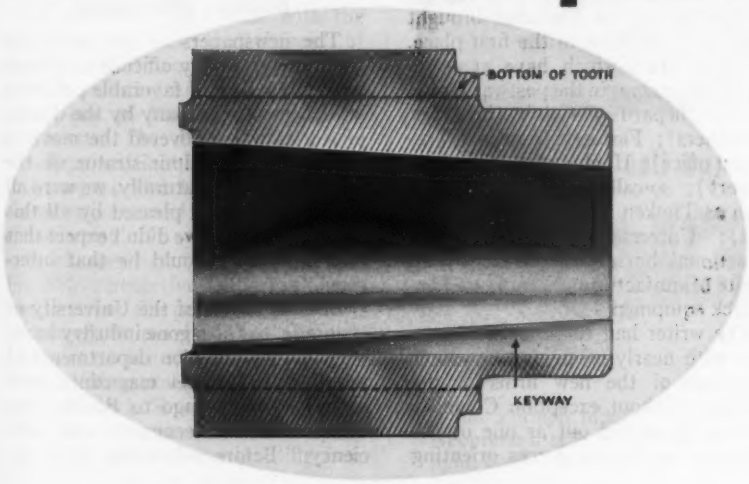
INITIATIVE and resourcefulness of the Chamber of Commerce, backed up by community support, brought these two plants to Colorado Springs.

AMFORGE CONTROLS GRAIN



A good example of how AmForge skill can control grain flow to develop maximum strength at key points. To increase the quality of the teeth in the small end of this double-gear, AmForge used small stock (to increase "working") AND put in a "cold-shut" or lap between the two gears. Note the ideal grain flow in this etched cross section. The grain dips as it passes inside the "cold-shut" and swells out to follow the contours of both gears.

for a better quality forging



Another instance of grain flow control. Here AmForge twisted the bar stock before forging, to bring the grain flow at approximately a 45° angle across the deeply cut keyway. Wall strength was greatly improved without altering the OD-ID dimensions, and breakage in service was eliminated. This is just one example of how AmForge experience can be a real value to industry.

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TWO MORE Colorado Springs prizes: Universal Electric Western (left) and Timken's rock bit plant (right).

nessmen feared new industries would intensify the labor situation and bring a sellers' market for that human commodity. In spite of these objections and well voiced protests, a program of attracting industry was initiated.

No one ever dreamed of establishing another Pueblo with its smoke laden steel mills. The city through its Chamber sought smokeless craftsmanship type of industries. Peterson Air Field a few miles east of the city was secured with its many buildings, and these facilities were made available to industrial fledglings who could try their wings in a low rent area before moving to the Springs proper.

Over 60 landed

Since 1945 over 60 desirable businesses ranging in size from those employing only a few employees to businesses like Shepard's Citations, employing several hundred workers, have migrated here. These businesses did not come to Colorado Springs by accident. They were sought by an active Chamber of Commerce and they were sold on the city much like dad is sold a new car by an automobile salesman.

Illustrative of the Chamber's selling approach to industry is the "Nestlé experience." This Swiss-dominated baby-food and powdered coffee firm seemed a perfect prospect for Chamber blandishments. The executives of the company had fallen in love with the Colorado life and there existed a strong possibility that the company's home office might move to Colorado. To make a long story short, the company's desk operatives, about 120 of them, moved West from New York in October, 1950.

George M. Loeffler, vice president of the company, in talking with the writer, noted the warm reception accorded these employees by the Chamber of Commerce and the whole community. Each member of the company and his family were met at the railroad depot by individual hosts and the host's wife. They were escorted to lunch and then taken to their homes or apartments which had been secured for them by the Chamber officials.

The Chamber promotion boys secured the old Plaza Hotel building for the 300 workers they were to employ. Unfortunately for the ending of this success story, in early 1952 Nestlé Co., Inc., was ordered back to White Plains, New York, and directed to merge with Nestlé Chocolate. In spite of the reverse twist to this story, only the old college try by the Chamber brought this company West in the first place.

Other firms which have come to Colorado Springs in the postwar period include Shepard's Citations (law book publishers); Farmers Insurance (regional office); Hobby Stationers (stationery); so-called clean industrials such as Timken Roller Bearing (rock bits); Universal Electric Western (fractional horsepower motors) and White Manufacturing Company (floral rack equipment).

The writer had the opportunity to visit with nearly all of the owners or managers of the new firms in the Springs. Without exception Chamber activity is singled out as one of the strongest motivating forces orienting industry to this Western community.

To the south of Colorado Springs the city of Pueblo attracted one industrial plum after the war in the Triplex Corporation of Chicago. The Chamber of Commerce of Pueblo was instrumental in bringing the municipally leased air base to the attention of President Lamb of the company, who subsequently moved his piston producing company to the steel city.

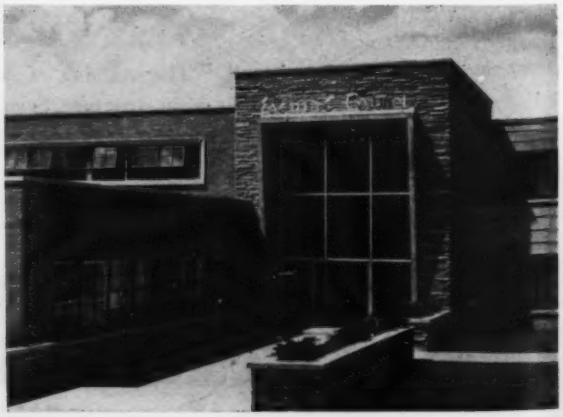
The Chamber acted as a field general in arranging the move and the publicity accompanying it. Telegrams of congratulation were dispatched to President Frank Lamb from many of the state's representatives, including Senator E. C. Johnson, Senator E. D. Millikin, and Governor Lee Knous. Community cooperation on a statewide basis was pledged to the company in its operation in Colorado.

Boulder's effectiveness

The newspapers of the state also welcomed company officials to Pueblo and a great deal of favorable publicity was given the company by the dozens of stories which covered the move to the state. One administrator of the company said, "Naturally, we were all very flattered and pleased by all this attention. I guess we didn't expect that the big wheels would be that interested."

Boulder, home of the University of Colorado, has also gone industry hunting. The subscription departments of the Esquire-Coronet magazines were moved from Chicago to Boulder "in the interest of economy and efficiency." Before relocating these de-

PUEBLO AND BOULDER also have been alert and active. Triplex Corporation (left) responded to an appeal to bring their piston manufacturing operations to Pueblo from Chicago, while Boulder persuaded Esquire-Coronet magazines to establish circulation headquarters there (right).



partments, possible locations were considered in Wisconsin, Indiana, Iowa, and a number of Colorado cities.

The writer had occasion to talk with Joe Ross, subscription manager of Esquire-Coronet as to the move. It runs like this. In August 1948 Ross and wife were vacationing in Colorado, and at that time he had been authorized to look about for a suitable location for the subscription departments for these magazines. He had inspected possibilities in Estes Park, Denver, Pueblo, and a few other Colorado cities.

Shortly before he was to return to Chicago, a Pueblo newspaper mentioned that he was in the city and the purpose of his visit. This news item came to the attention of Francis Reich, secretary of the Boulder Chamber of Commerce. Action was soon forthcoming.

Reich wired Alfred Smart, president of Esquire, and requested that Joe Ross be directed to visit Boulder before returning East. This the President did. A few months and many telephone calls and wires later final negotiations were made for the Boulder location. But the story does not end here.

Development company

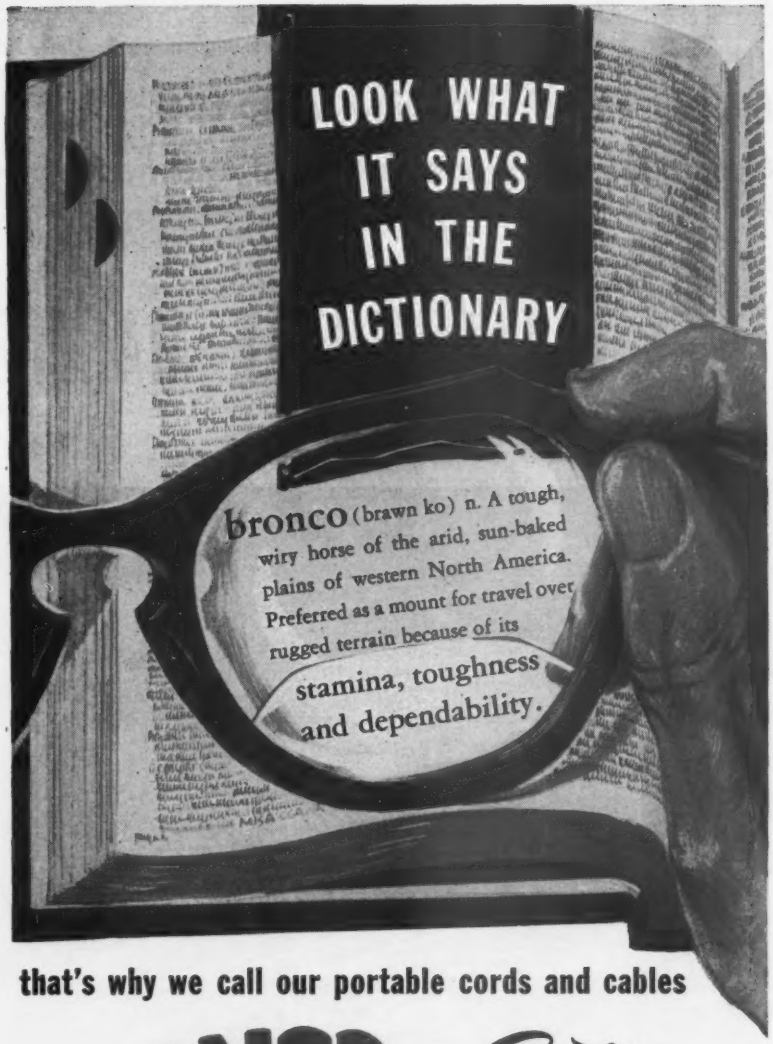
An agreement was made with the company whereby the citizens of Boulder would acquire land and construct a building to be occupied by a pilot plant of Esquire's subscription operations. The Boulder Industrial Development Company was set up for this purpose and 175 business firms, organizations, and individuals purchased stock.

Stock was sold for $100 per share for 5% cumulative preferred. Each purchaser of the preferred stock was permitted to purchase one share of common stock at $1 per share of preferred. Voting power was vested in the common stock. Should the pilot operation prove successful the company agreed to purchase the building from the Development Company.

Operations were successfully carried out, Coronet moved its subscription department here and the original building was purchased and enlarged by the Esquire-Coronet company. The operations now boast a $400,000 annual payroll and represents Boulder's largest private industry from point of view of personnel employed and payroll paid out. The Development Company was liquidated and stockholders paid for their stock along with the promised 5% dividend.

Other Colorado cities have had similar experiences. All is not honey and roses, however. There is one city on the

Concluded on page 54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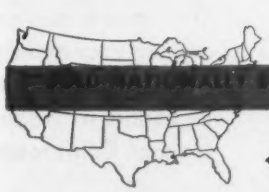

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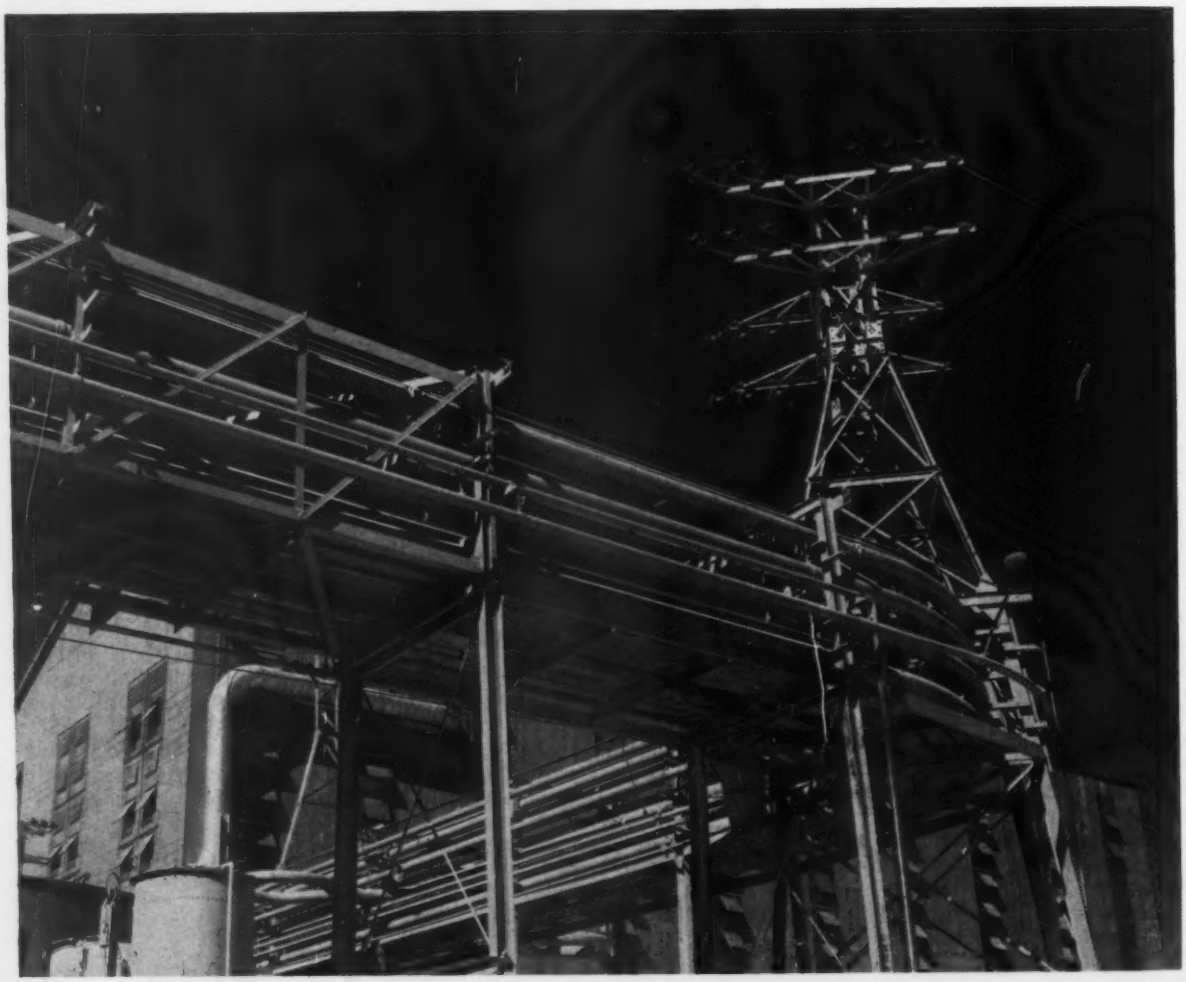

This special section presents valuable information on making your maintenance program more efficient while keeping costs at a minimum. It contains the summarized highlights of papers from the recent Electrical Maintenance Conference held in Los Angeles.

By
R. C. SAMUELS
Assistant Chief Engineer of Maintenance American Potash & Chemical Corp.

THE DESIGN engineer should continually consult the maintenance department as to their experience in maintaining the equipment he has in mind. He should study each installation to determine how well he is guarding the equipment from the enemies of all electrical equipment.

The enemies of electrical equipment are:

1. Heat due to high ambient temperatures
2. Moisture
3. Dusts and dirt
4. Corrosive fumes and liquids
5. Continuous maximum loads and overloads
6. Frequent operations

To overcome heat, the simplest thing to do is to derate the equipment so that equipment hot spot temperature will never exceed design hot spot temperature, in spite of high ambients. One can calculate the per cent of manufacturer's rating sufficient for practical purposes by assuming that all heat generated is proportional to the current squared, and that the heat dissipated to the cooling air is proportional to the difference between the hot spot temperature and the ambient temperature.

Moisture is the death of electrical equipment, particularly salt spray. Every effort should be made to protect all contact surfaces and insulators from any possibility of becoming damp or wet.

Dust and dirt must be kept out of all control equipment. Motors, pushbuttons, etc., should be mounted in rooms or dust-tight units.

To prevent corrosion from fumes and corrosive liquids, all possible equipment should be mounted in rooms. Remaining equipment such as motors, pushbuttons and conduit should be of material resistant to the corrosive elements present.

Continuous vs. eight-hour cycle

There is a great difference between operating equipment on an eight-hour duty cycle and operating continuously. Equipment must be sized to take these loads continuously and to withstand the momentary overloads that are sure to occur. Equipment that is continually starting and stopping must have life cycles without repair that are within reason. Selection should bear careful study of equipment costs versus maintenance costs.

The maintenance department should be a partner in selection of equipment. Too many times designers do a grand job of placing all the mechanical equipment in its proper place and then suddenly realize that electrical equipment requires space and none has been provided. As a result a scramble is made to tuck the electrical equipment in somewhere. The equipment is crowded and hard to work on and maintenance is high.

Electrical equipment should be given even more care in its installation than mechanized equipment. In a chemical plant, all control equipment should be in rooms and arranged for ease of inspection and repair.

Electricians required to maintain the equipment should know why the equipment is made as it is, what its limitations are, how it is supposed to work, and what it is supposed to do.

Spare parts needed

As the complexity of equipment increases, more training is required. Electricians must become specialists in their particular areas of the plant. As a result, we have power house electricians, linemen, production area electricians, motor winders, shopmen, and construction electricians.

In order to do a quick repair job, an adequate source of spare parts is necessary. We maintain a warehouse where parts are stocked according to code numbers. We have made up sheets listing spare parts for each piece of equipment. The heading carries the name of the equipment and nameplate data. The left-hand column is our warehouse code number, the next column the manufacturer's catalog number, followed by a description of the part.

From this book an electrician can quickly determine if parts are on hand and immediately order from the warehouse by our code number. If not stocked, he can write a purchase requisition. Number and type of parts to be stocked can only be determined by individual plant experience. They are dependent upon number of units in use, severity of the service, importance of the unit, and availability from a supplier.

Plant maintenance problems

Our turbo-generators are given a general inspection once each year. In the meantime, exciter commutators and generator rings require continuous attention.

Slip rings generally start to heat after every sandstorm. Sand gets under the brushes and starts to scratch the rings, increasing friction. We have found that threading the rings is a great help. A thread 1/16 x 1/16 in. on a ¼-in. pitch does the job. A further aid is to put a few drops of oil on canvas and hold the oiled spot against the rings for a minute or so. About five minutes later, wipe the rings with a dry piece of canvas. This should be done once every shift.

Proper spring tension should always be maintained. It is difficult to get personnel to realize that the sparking brush is not the one giving trouble. It is the brush carrying the load. Invariably the operator will increase the brush tension on this load instead of examining the dark brushes and cleaning them or increasing their tension.

Type of brush to use depends en-

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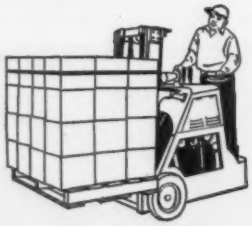

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tirely on plant conditions. At Trona, dry air prevents brushes from operating that would normally be satisfactory in areas of high humidity. The type of brush to use is the type that works.

Spring cleaned commutators

Commutators of the shaft exciters are always turned, mica cut, and new brushes installed just before the hot season. Summer is the most severe time of the year, because ambient temperatures reach at least 132 deg. F. in the power house. Long life depends upon the commutator surface. Care in polishing the surface of a commutator immediately after turning is all-important. This can be done by simply holding the back of a piece of sandpaper to the commutator while it is running at rated speed. The paper both polishes and heats the surface, actually hardening the copper.

Circuit breakers are thoroughly checked in the spring. Oil is changed if necessary, and all nuts and bolts are tightened. Any signs of heating are immediately investigated, and silver-faced contacts are installed in place of any copper contacts that have given trouble.

Operating mechanisms in dirty locations are taken apart and cleaned and under no circumstances are the bearing surfaces oiled, since oil will pull dirt into the joints. No adjustments are made to faulty mechanisms until they are fully cleaned. Usually only cleaning is necessary.

Washed insulators

Outdoor insulators on transmission lines and transformers within the plant are washed whenever the opportunity presents itself. These insulators are all 23,000 volt for our 6,900-volt distribution system. Salts accumulate on the insulators and sometimes arc over during rains. A heavy rain seldom causes trouble. Washing insulators with a spray system while hot has been suggested, but they get dirty so fast that the cost would be prohibitive. Never have we lost transformer bushings. They flash and arc during rains but never fail.

Pole fires have been brought to a minimum by bonding all hardware. No grounding of hardware is necessary. No lag screws or wood screws are used because the wood cracks and they fall out.

Transformers are cleaned externally once each year. Oil is filtered and checked for acidity. If acidity is too high, the transformer is taken out of service and the core pulled and cleaned before new oil is added. The old oil is used for cleaning by pumping under

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pressure through a nozzle on the end of a hose. The electrician directs the hose through all ducts and sides of the core, removing most of the sludge. Plugged ducts are opened by pushing a fiber rod through them. The core is allowed to drain, minor repairs to insulation are made, and the core re-installed. The case is painted black to reduce the transformer temperature.

All transformers are inspected once each month along with the transmission lines. In a few substations, the transformer cooling has been increased during the summer months by mounting fans on pedestals to blow air through the cooling radiators. The fans are standard ¼-hp. totally enclosed ball bearing motors with a 19-in. four-bladed fan mounted on the motor shaft. A 15 deg. F. drop in temperature has been achieved by this simple method.

Safety switches fail

Safety switches continually give trouble when they carry more than about 75% of their rated load. Fuse ferrules and other fiber parts char and become brittle as they age. All switches are inspected whenever the opportunity occurs. All screws and nuts are tightened in an endeavor to keep heating down. It is difficult to make the average electrician understand that a hot spot may be caused by a loose connection some inches away from the hot spot. In some cases it has been necessary to silverplate the contacts.

We have had so much trouble with safety switches failing that we are now using circuit breakers because of their higher interrupting rating and lower maintenance. An operator can always open a circuit breaker under load without fear of it exploding. Continuous loads in high ambients is severe on switching equipment. Just rating safety switches on the basis of fuse rating is, in my mind, a very poor system.

Magnetic starters are also inspected along with the switches. Contacts are examined, cleaned and adjusted, and new contacts are installed when necessary. One problem has been to teach electricians not to file contacts unless purple oxide exists, and then only enough to remove the oxide. The best contact is one that burns in and the contact surface looks like a piece of ordinary sandpaper.

We have had trouble with shunts corroding to the point of failure because of hydrogen sulphide gas in the atmosphere. Recently we have been dipping shunts in "Airvulc" rubber latex and allowing it to dry. We have not had enough experience yet to know whether the rubber will give sufficient protection to prevent corrosion or whether it will harden to prevent operation of the contactor. Corrosion has been so severe that shunts have had to be changed at least once a year. It has been noticed that tinning the surface with high tin solder helps a lot. Also, that the hotter the equipment operates, the faster is the corrosive action.

Solderless connectors came into vogue and immediately stranded wires began to burn off about six in. from the lugs. This was due to the compression pressure of the solderless connectors becoming less as the temperature changes took place. The outer layer of stranding carried the current and became overloaded. This layer burned in two, thus overloading the next layer, until ultimate failure resulted. After tightening up the connector and then dipping it and the wire into hot solder, no more failures occurred. We therefore solder all solderless connectors that come with electrical equipment.

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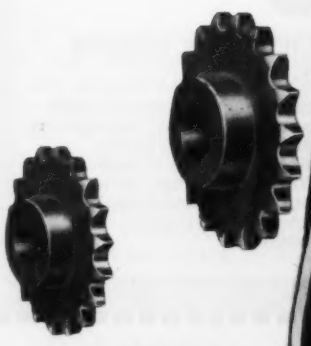

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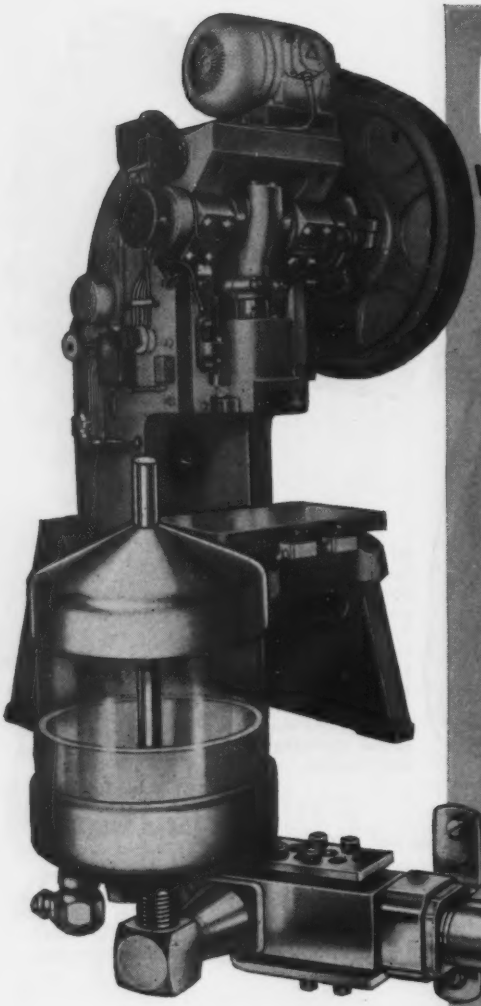

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The high ambient temperatures can be overcome by derating motors or using high temperature insulations. In dry locations Class H insulation solves the problem. In wet locations the standard insulations seem to work out just as well.

In wet locations, the drip-proof motors with form wound coils do a pretty fair job. Open motors with louvered metal housing placed over them have, in some locations, been quite satisfactory. The only real answer has been totally enclosed fan-cooled motors made for the chemical industry. Even here aluminum fans have given a great deal of trouble. They freeze to the shaft and cannot be removed without breakage.

Totally enclosed motors

Our greatest trouble has been from motors on close coupled pumps. The moisture from the packing glands enters the shaft end bearing and not only ruins the bearings but works on through and causes winding failures. Many seals have been tried, but as yet we have found none that are satisfactory.

Totally enclosed motors are the answer for dry, dusty locations. If there is moisture present, the dust clings to the screen over the fan suction and will gradually build up until all air flow is stopped. This requires constant cleaning of the screens. If the moisture is in the form of a salt spray, it will impinge on the fan blading; the moisture will evaporate and leave salt on the blade. In time the fan becomes a solid mass, necessitating removal of the end shield and breaking the salt off the blades.

Some drip-proof motors which were mounted near the floor continually burned out whenever hot water ran over the floor. Someone put a sheet metal stack on the air intake, extending up about 2 ft. with a shield over the top opening. This, of course, cut down on the air flow but did effectively keep out the wet vapors. Although life was cut short because of low air flow, it was greatly extended because of the elimination of moisture.

Overloading check

The finest tools for detecting overloading are the clipon and curve drawing ammeters. For a quick check of overloading and single phasing, the clipon ammeter does the trick. The curve drawing ammeter gives a load record continuously and determines kicking off due to overload or faulty overload relay. Thus, if the curve drawing meter shows that the motor is not overloaded, then the overlay relay is adjusted or the heater strips changed

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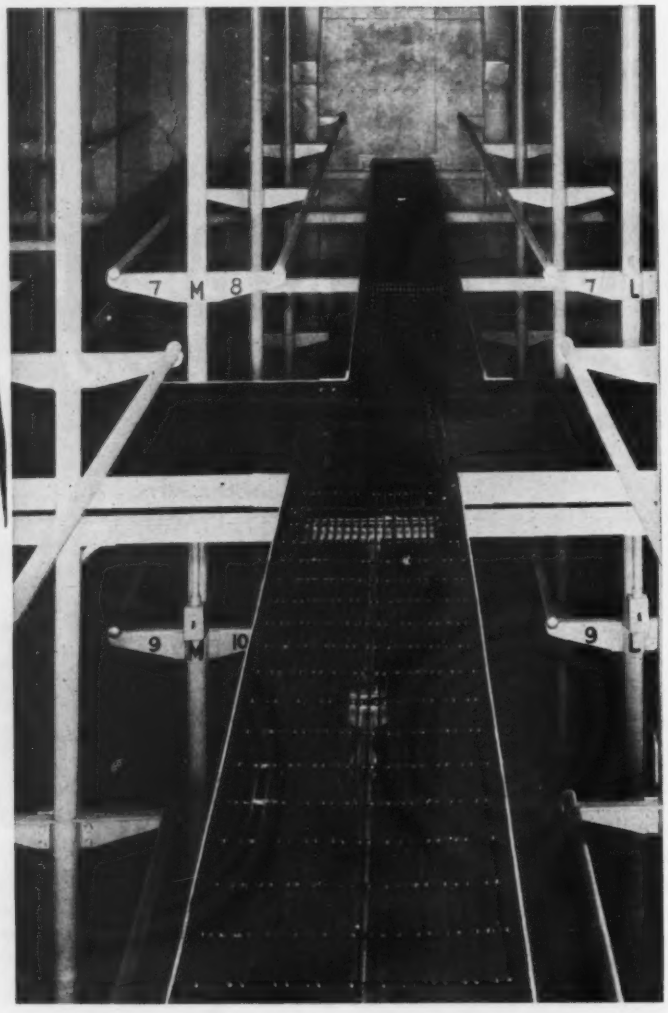
Another Typical Blaw-Knox Installation



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until no tripping out occurs. This is the best and easiest way of calibrating thermal overload relays.

If a clipon meter shows that one phase is not carrying current, the first thing to look for is a loose connection. Loose connections will conduct when the motor is starting but will stop conducting when the back electromotive force reduces the voltage drop across the loose connection sufficiently.

Overload reduction

Pump overloads can be reduced by cutting the pump impeller to the proper size. Here the ammeter plays an important part. At loads above 50% rating the current is almost directly proportional to the horsepower output. Also, the horsepower required by a pump varies almost directly as the cube of the diameter or peripheral velocity.

Thus the ratio of the load current to the motor rated current is equal to the ratio of the cube of the pump impeller diameter to the cube of the required impeller diameter. It is amazing how accurately this rule will work, if changes are not over 10% at a time.

COLORADO INDUSTRY

. . . Continued from page 45

eastern slope of the Rockies which has experienced no industrial growth through the influx of new firms.

Their Chamber approach to new industry explains why. In one instance a relatively large firm had decided upon a location in Colorado but officials had not decided where.

The company, which expected to maintain a working force of over 100 employees, sought community aid in securing a building to house its operations. The company expected to pay for the building but it sought Chamber help in finding one. One Chamber of Commerce official commented to the company president as follows: "Why should we help you? You ought to pay us for the privilege of locating in a town as nice as . . ." Company representatives located their plant in a more cooperative Colorado city.

In another community in Colorado, officials of a certain company decided to locate a new manufacturing unit here and construct a building which cost over $200,000. The Chamber of Commerce of the community erected a sign at the site of the prospective plant announcing the proposed building plans. In turn, they billed the owner of the company $100, the cost of the sign. The owner of the new enterprise was less than completely enthusiastic over the receipt of this particular bill.

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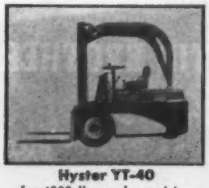

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DEFEAT DOWN-TIME DEMONS

AN ELECTRICAL maintenance program as described by Ray D. Dingler, in charge of electrical design, construction and maintenance for Monolith Portland Cement Co., at the EMEA 1953 Electrical Maintenance Conference, Los Angeles.

A quick check list designed for efficient use of non-productive down-time in your plant follows.

Work to be done on down-time periods:

1. Clean and inspect motor windings.
2. Check bearing lubrication.
3. Check air gap and megger.
4. Clean and repair all controllers.
5. See that controllers line up well and mechanism is free to work.
6. If fuses are used, check fuse holders for tension and contact.
7. Check all push buttons, interlocks and limit switches and see that they are functioning properly.
8. Check all oil circuit breakers for liquid level, cleanliness and dielectric strength.
9. Make complete report of all repairs on equipment so a perpetual record can be kept during the life of the equipment.
10. Oiler is responsible for cleaning all motors periodically, checking and changing lubrication when necessary, checking temperature of motors and bearings during operation.

Maintenance man for lighting:

1. See that all fixtures are clean, have the proper light bulbs and are in operating condition.
2. See that unnecessary lights are turned off during the day.
3. Change worn-out switches and make minor repairs for lighting system.
4. See that proper size fuses are used on all lighting circuits.
5. Patrol all transmission lines at the town site, plant to quarry, and quarry once a week.
6. Check for broken insulators, cross arms, bad poles and bad wiring.
7. All repairs to the transmission lines shall be done by the repair crew.

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2 THE CONTAINER MUST ASSEMBLE AND CLOSE IN LITERALLY SECONDS—MUST KEEP LABOR COST DOWN.
3 IT MUST STACK SAFELY, STURDILY—SAVE BOTH TIME AND SPACE.
4 IT MUST ABSORB SHOCK—NOT TRANSMIT SHOCK TO THE PRODUCT.
5 ITS LIGHT WEIGHT MUST REDUCE TARE WEIGHT, REDUCE FREIGHT BILLS.
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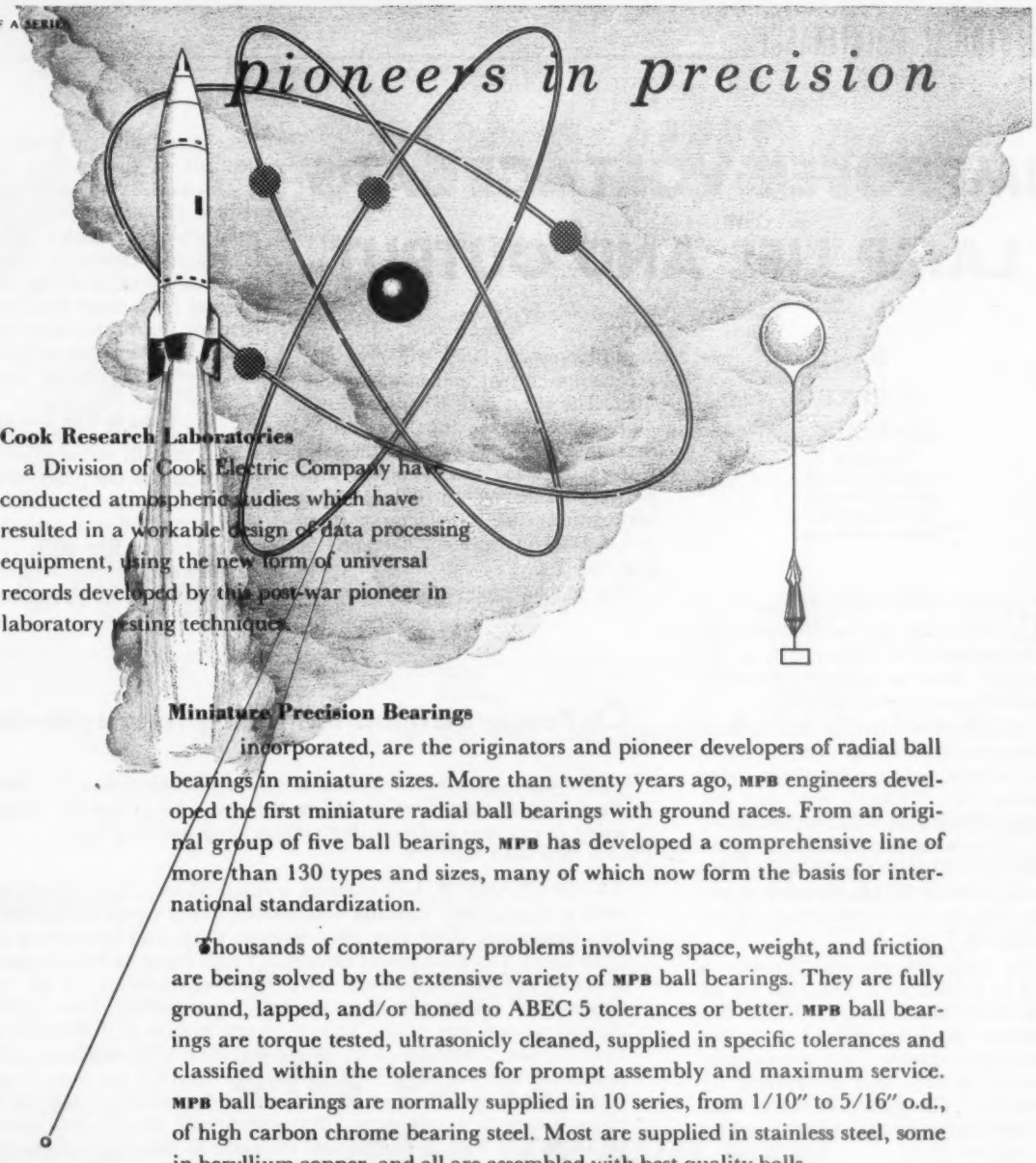

Cook Research Laboratories
a Division of Cook Electric Company have conducted atmospheric studies which have resulted in a workable design of data processing equipment, using the new form of universal records developed by this post-war pioneer in laboratory testing techniques.

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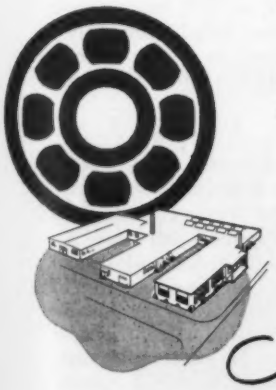

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IMPROPER VOLTAGE SAPS LAMP LIFE AND OUTPUT

By
ROBERT MARCUM
Supervisor
Engineering Records and Studies Group
Plant Engineering
Hughes Aircraft Co.

EFFECTS of undervoltage and overvoltage on light output and life expectancy of lamps can be an important factor in reducing electrical maintenance costs in the plant.

With undervoltage, an incandescent lamp gives reduced light output, draws less current, and has a greatly extended normal life. Offhand, this may not seem detrimental. However, a lighting installation is planned for a given maintained lighting level, and if this level is not obtained, we are not getting our money's worth from the installation.

As a specific example, consider a 115-v. incandescent lamp burned at 5% undervoltage or 109 volts. At this voltage, the lamp will have its life expectancy doubled, will reduce light output by 18% and the current by about 3%. The light is basically what we are paying for and it is reduced by nearly one-fifth.

When it's not critical

Undervoltage isn't so critical for fluorescent lamps unless it drops to the point where the arc is unstable. Five per cent undervoltage for a 40-watt, 2-tube fixture will reduce light output by 3% and wattage by 7%. Again, we are not getting the light we paid for, but 3% of the light output is of little consequence.

With 5% overvoltage, the incandescent lamp will have its life reduced by 50%, will give 20% more light, and will draw 30% more current. This might be all right for floodlighting a ball park, but only 50% rated life for incandescent lamps in an industrial plant means higher replacement costs per year.

Five per cent overvoltage for a 40-watt fluorescent lamp will give 2% greater line current, and only 3% more light. The effect is of no consequence other than that the tube life will be decreased. At higher voltages the tube will conduct too much current and possibly cause ballast failure. This lamp will operate satisfactorily from 105 to 130 volts with emphasis on the high side.

The stroboscopic effect of fluorescent and slimline lamps also is dependent on the type of distribution system used. Standard lead-lag ballasts reduce the stroboscopic effect to a point where in ordinary applications it is negligible (relative effect −9). A three-lamp fixture will have a relative effect of 14. A single lamp will have an effect of 19. A three-lamp fixture with three ballasts on separate phases would have a relative effect of three.

Fixtures and phases

It is usually satisfactory to put a fixture on just one phase and keep adjacent fixtures on separate phases. This stroboscopic effect is caused by cyclic variations of alternating current and is maximum for blue and minimum for green-colored fluorescent lamps.

Power distribution for lighting systems

The lighting distribution system is of considerable interest to industry. By raising the distribution system voltage, savings can be effected by using less copper and reducing voltage drop and line losses.

AS AN EXAMPLE, let's compare a single phase, 120/240 volt system with a three-phase, 120/208 volt system. We'll compare current since that determines conductor sizes, voltage drop, and power loss in the conductors. The basic power formulas: single phase and three phase, are required for the comparison. Two 1,200-watt circuits on the 3-wire, single-phase system will draw 10 amps from the line. Two 1,200-watt circuits on two legs of the 3-phase, 4-wire system will draw 6.7 amps from the line. The three-phase system will draw 33% less current for the same load and will have 33% less voltage drop for the same length of circuit. Looking at it another way—if we use all three legs of the 3-phase system to supply three 1,200-watt branch circuits, line current is 10 amps. The line current is now the same as the single-phase system, but we are now supplying one additional circuit, or 33% more power transmitted for the same voltage drop and line loss. In addition, only 4 conductors are required to serve 3 circuits in a 3-phase system whereas the single-phase system required 5 conductors for 3 circuits. This ratio is not constant.

IF WE COMPARE the 120/240-volt single-phase system to a 277/480-volt, 3-phase system, the comparison is even more striking. The 120/240-volt system still draws 10 amps for two 1,200-watt branch circuits. Two legs of the 277/480-volt, 3-phase, Y-connected system, will draw 2.9 amps line current. This 2.9 amps is only 29% of the 120/240-volt system value. The line voltage drop is only 29% as great and the power loss in the conductors is only 9% as great. If we use all three legs of the 3-phase system to supply three 1,200-watt branch circuits, line current is now 4.3 amps. This 3-phase system will transmit 33% more power with only 43% as much line current. On branch circuits, reduction in line current doesn't mean we can reduce copper size below number 12, but it does mean that we can use number 12 wire for longer circuit runs. The real saving in copper size will be realized in the panel feeders.

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The Lufkin Line

By VIC FAWCETT

Vic Fawcett

BEATS SLEEPING PILLS

Sometimes it is hard to say how much good or harm a thing like this does, until some real, honest friend comes along and gently lets out his sincere opinion.

K. N. Saatjian of The Texas Company purchasing department, or "Judge," as he is affectionately known to his host of friends, told me how much he was enjoying our column "The Lufkin Line."

We were on our way to lunch. We hadn't talked about gears or pumping units or anything like that—MUCH. Maybe that's why Judge said it. Anyway, it makes a guy feel good to know that people are noticing what is said, and hoping that it will be readable.

"Do you really read it, Judge," I inquired. Judge said, "Sure I read that column every night—right at bedtime—puts me right to sleep."

Now I know. This may not help to sell Lufkin pumping units, but if you are troubled with insomnia, why not try "Judge" Saatjian's formula?

Vic Fawcett

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WIPE 'EM OFTENER—

and lighten your maintenance load

By FOSTER K. SAMPSON
Electrical Engineer

LIGHT UTILIZATION and distribution problems are common to all lighting fixtures, but there are numerous small easily overlooked points that ultimately are important in both the selection and maintenance of lighting equipment.

The reflector surfaces must be able to maintain their efficiency. If air conditions are bad, frequent cleaning may be required; however, it is useless to clean a reflector which has lost its efficiency. Corrosive vapors in the atmosphere make this selection vitally important.

Removable fixtures

If there are louvres, shields, or lens covers, they should be adequate to do the job. They must be easily removed for cleaning and replacing lamps, and they should be designed so that they are not easily bent or broken.

Some slimline fixtures take either two men on separate ladders or one man must move his ladder back and forth from one end to the other, to open and close the louvres when relamping. Many of the currently popular fixtures have louvre blades supported at the center of the fixture but not down the sides. Even before installation is complete, many louvres of this type are bent and out of line.

In incandescent and fluorescent fixtures sockets are extremely important. Extra cost of a good socket is nothing compared to the cost of replacing poor ones which fail.

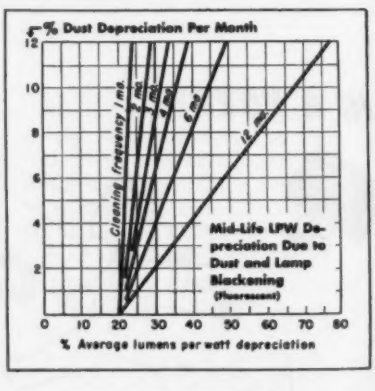
All metal parts of the fixture should be treated to prevent rust. Few fixtures do not get scratched somewhere and if this rust-proofing is omitted, it will only be a short time before the rust will mar what might otherwise be a good-looking unit.

The paint job on a good fixture completely covers the surfaces. There must be no shadow where the paint missed, say on a lapped weld. Take the fixture apart and see what it looks like, both inside and out. A coin or a key will easily scratch a poor paint job, but one properly finished will not be damaged.

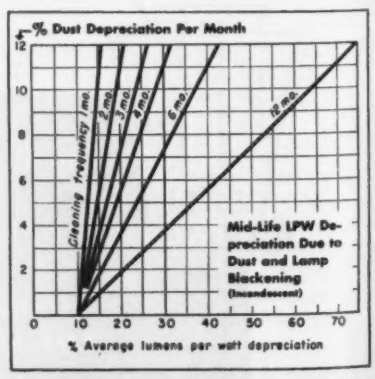
Is wiring and auxiliary equipment easily accessible? Are the nuts, screws and bolts captive, or do they drop out and get lost when you uncover the wiring? Be sure that you don't have to take the fixture off the ceiling, if it is so mounted, in order to change the lamps or starters.

Many hand-made fixtures appear well and are satisfactory in many ways; however, these "works of art" may become a "house of horrors." Some degree of dis-assembling is usually required to install these fixtures. Taking the units apart may be no problem; however, when it comes to reassembly, trouble will appear. Either screwed or bolted connections which are not drilled in a jig will not line up, and you can imagine the consternation of the wireman or maintenance man faced with the job of sorting paired parts of several hundred fixtures.

FLUORESCENT LAMP and fixture dust depreciation that can be expected with 1-12 month cleaning intervals, at a rate of 12% monthly.



INCANDESCENT LAMP and fixture dust depreciation that can be expected with 1-12 month cleaning intervals, at a rate of 12% monthly.



Charts courtesy Panama Lamp & Commercial Co.

R - E - M - O - V - E DIRT and RESISTANCE

prime deterrents to efficient lighting

By BENN J. HARTMANN

Manager, Fluorescent Division
Flood-Lite Service, Inc.

IN developing our lighting maintenance company we had to, of necessity, create various types of equipment and methods to economically and efficiently maintain our lighting systems. Some of these gadgets and methods might well be of interest to industry in general.

While washing any plastic parts, i.e., side panels, louvres, or any part of a lighting fixture, do not attempt to dry these parts by rubbing them, as this will negate the entire cleaning process. When you attempt to dry plastic fixture components by rubbing, the plastic will act at a condenser, retaining a static electrical charge, which will attract dust particles, resulting in a luminaire which becomes dirty and inefficient very quickly.

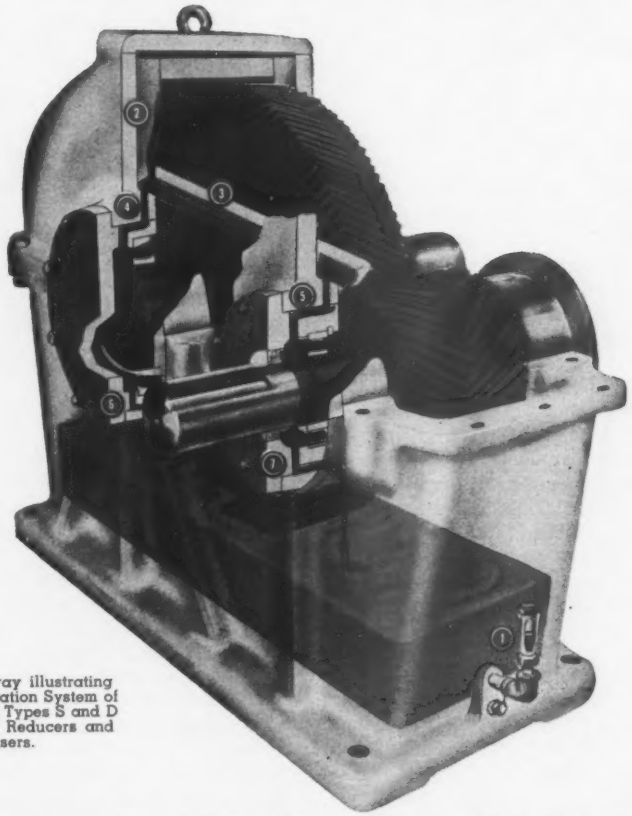
Use a good detergent in warm water, and let the parts air dry. This applies not only to plastic parts of fixtures, but also to fluorescent and slimline lamps as well.

To cut down resistance

Resistance, the prime deterrent to complete and efficient utilization of electrical energy, can be very simply cut down in fluorescent and slimline lamps. When installing either fluorescent or slimline lamps, take some emery cloth cut in 1-in. strips and rub the contact pins. We have thus gained in length of time between service calls and increase in lamp life. Another way to increase equipment life is to rub a little vaseline on the spring contact of a slimline lampholder. This simple application facilitates starting and is of immeasurable value especially in damp, sea coast locations.

In large plants and offices we use a lamp cart. It measures 32 x 48 x 50 in. and is partitioned to hold the variety of lamps which are used in the building to which the particular cart is assigned. When a man starts off on his rounds of the building with a completely replenished cart, it is very seldom that he will have occasion to return to the stock room during the day. Any piece of equipment he may require to take care of any contingency in maintenance is always with him.

gears with Guts



Cutaway illustrating Lubrication System of Lufkin Types S and D Speed Reducers and Increasers.

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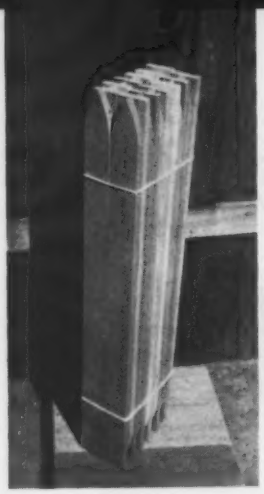
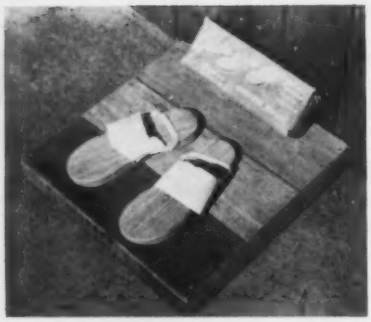
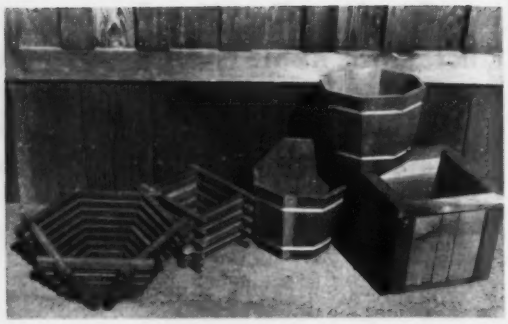






LEFT TO RIGHT: Pickets for handsome redwood fences are produced from split or cull material. Sandals made for shower and beach wear have found a ready market and are made from end trimmings less than three ft. long. Planting boxes are manufactured from end trims and edging wastes.

PRODUCTS FROM REDWOOD WASTE

Edgings, sawdust, trimmings, and shavings become useful products from wood wastes

UTILIZATION of redwood lumber wastes to the fullest extent at Rounds & Kilpatrick Lumber Co. has netted nine new products or industries for Cloverdale in the past three years.

These new products, nursery flats, bean poles, beach shoes, vineyard mulch, fence pickets, grape stakes, plant boxes, and short pieces glued together to erect small buildings and caskets, are all results of close utilization of redwood wastes.

John Rhoda, manager of this progressive remanufacturing lumber mill, is acutely conscious of lumber wastes and attendant loss of revenue. His carefully designed three-year-old plant incorporates flexibility and versatility, yielding nothing to the burners that can be utilized for production of useful and worthwhile by-products.

Top grades used

The Cloverdale operation receives only top grades of select and shop green lumber from its sawmill at Rockport, and through a process of resawing, surfacing, grading, and drying prepares this lumber for shipment to retail outlets.

Utilization of shorter lengths of redwood has always been a problem in this industry. Large amounts of lumber are wasted daily by the carpenter who orders 20-foot lengths and then cuts them into 4- or 5-foot boards for use on the corner of a house. Modern houses are built with a great many windows and this introduces a need for very short lengths which can be bought more cheaply than the random longer lengths. In Cloverdale many homes have been built using these shorter lengths, with one large automobile storage yard being constructed entirely of boards 7 feet or shorter. In spite of slightly higher costs of handling additional boards, over-all costs are lower due to reduced costs per foot of the shorter lengths.

Beauty as well as utility was obtained when an R & K employee made a large garage out of 2-foot lengths of redwood siding. Another employee has a large storage shed built entirely out of 2-, 3-, and 4-ft. lengths which were procured very reasonably, making construction costs low.

The plant's locker room of 1,500 sq. ft. is built entirely of boards 2, 4, and 6 ft. long, with walls and roof sheathed in rustics of varying widths.

One small plant is purchasing R & K end trims of 3 ft. or less and cutting these boards into sandals to be used as beach shoes or shower glides. These redwood-soled sandals are being sold in great numbers to the Army, Navy, beach resorts and department stores.

Short fellows

Loads of short trimmed ends and edgings are also hauled weekly to a small factory in the San Francisco area where garden boxes, planters, trellises, and other wooden equipment is manufactured for the garden trade.

A small factory has located near the mill to manufacture shook for nursery flats. This operation employs five men and uses practically every available piece of lumber larger than 1′ x 3′ x 18″. These flats are made on a unique production line basis and shipped to the Los Angeles area. Bean poles for the string-bean fields of Orange County are made here, as well as plant sticks for small gardens.

WASTE BINS to be dumped into the waste burner now contain nothing that can be turned into a usable product.

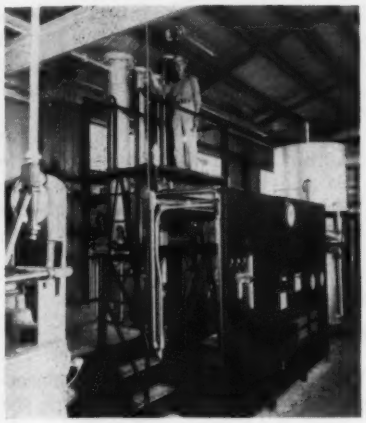
Sawdust and shavings from the planing mills are normally blown into a large bin where they are used for fuel, providing steam to operate dry kilns. However, local farmers are now using some sawdust and shavings as a mulch for their vineyards. There is also a demand from local gardners and from ranches for bedding material.

Caskets constructed

At one boundary of the plant a casket company has been established to utilize many short items and materials difficult to sell in ordinary lumber markets. A Linderman machine makes wider boards out of narrow strips by edge gluing, and a finger joint gluing machine fits 2- and 3-foot long boards into boards of the necessary length.

Located in the plant is a machine for cutting a rounded point on the end of short lengths of 2-inch stock. These are made entirely from split or cull stock and sold for picket fences.

OIL-SHALE RETORT yields are promising



PRELIMINARY test operations at the Petroleum and Oil-Shale Experiment station in Laramie, Wyo., are showing a high yield of better products by a new and promising retorting process. A one-ton-a-day pilot plant employing this high temperature "entrained-solids" process offers the following advantages: Continuous extraction methods saves time; the major products are a high quality oil and high-octane gasoline; large quantities of premium-priced aromatic chemicals are obtained; the process is flexible.

The pilot plant consists of a gas fired furnace containing hairpin-shaped alloy-steel retort tubes 3½ in. in diameter, a spent-shale recovery system, and a gas sampling system.

Oil-shale particles, crushed to a ¼-in. size or smaller, are packed up by superheated steam and carried swiftly through the retort tubes at any desired temperature from 900 to 1,800 deg. F. The shale is retorted almost instantaneously, and the oil-bearing vapors pass on to the spent-shale recovery system. There, 98% of the spent or waste shale entrained in the steam is removed by a series of cyclones and dust separators.

The oil or vapor recovery system consists of two main parts: Two water-cooled condensers operating at atmospheric or retort pressure that remove the water and heavy-oil vapors from the stream; and two additional condensers, one water-cooled and one refrigerated, that operate at 100-lb. pressure, and remove the lighter vapors. A continuous sample of noncondensable gases is collected in one or two 50-cubic-foot gas holders, and remaining gases flared.

Crude-oil yields as high as 21 gallons per ton have been obtained from shale analyzing 30 gallons per ton compared with naphtha yields of up to 6½ gallons per ton. The shale handling capacity is much higher than in the average retort, amounting to 8,050 lbs. per hour per sq. ft. of cross-sectional area. A disadvantage of the process is that it requires finely-crushed shale, and crushing is expensive. Particles of ¼-inch size have been used satisfactorily, however.

RAM AIR TURBINE for emergency power

A RAM air turbine that supplies emergency hydraulic power for jet aircraft in event of an engine failure at either high speed or landing speed, has been developed by AiResearch at Los Angeles.

The turbine can be extended into the air stream or installed in the main air duct. At Mach 1, it reaches full power in less than a second, and at landing speed, in three seconds. The turbine wheel operates a pump which develops the necessary pressure to operate the aircraft control system or other vital units whenever the main hydraulic power system fails.

The entire ram air turbine weighs 15 lbs. and is 12 in. in diameter, occupying less than ¾ of a cu. ft. of space.

Got power transmission..or process control problems?

CONSULT RUCKER

you can do it better hydraulically

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The RUCKER Organization provides experienced engineers, fully qualified to understand, discuss and analyze your needs.

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Complete systems and special operating equipment designed to fit your specific requirements.

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● If you've rassled with old-style geared threaders, you'll go strong for this RIDGID 4P. It's got balanced loop handles—a cinch to carry and to swing onto pipe. Mistake-proof workholder sets to size before it's put on pipe—only 1 screw to tighten. Easy upkeep—drive pinion in oilless bronze bearing; safe enclosed gear. 4 sets of 5 high-speed steel dies, 2½", 3", 3½", 4"; ratchet handle. RIDGID Universal Drive Shaft available—also 4P for conduit. Buy worksaver 4P at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

OUIJA BOARD IMPROVES circular saw safety

AN INTERESTING presentation on the Forest Products section of the Industrial Safety Conference was a motion picture showing the performance of a circular saw with the use of the "Ouija Board" developed by Harry Nason of Nason Furniture Co., Los Angeles.

The Ouija Board is a plywood panel slotted to receive the saw, having a steel strap guide on the underneath side which lifts the saw's fence slot permitting the panel to slide forward and backward. A hollowed-out guard covers the saw, except for the minimum area in which stock is to be cut.

INDUSTRY EXPOSITION for engineering students

TO HELP STUDENTS interested in studying engineering decide which engineering fields they would prefer, the East Los Angeles Junior College recently organized a display of exhibits which were contributed by 35 industrial firms in the Los Angeles area.

This project, one of the first of its kind ever set up for vocational guidance to future engineers, was intended to show students the end results of engineering prowess and the interesting projects and methods which are being designed and utilized to expedite progress.

Among the exhibits were a scale model of Fabriform Metal Products controlled atmosphere electric copper brazing furnaces, a cutaway rocket motor displayed by the Army, and a model of a gasoline cracking system by the Fluor Corp.

"SKY HOOKS" for mine roofs

WITHIN TWO YEARS the number of mines in the Rocky Mountain area using roof bolts has more than doubled, as operators acclaim this method of reducing accidents and costs. Roof-bolting or "sky-hooking" consists of using simple steel rods that pin up mine roofs or overhead rock, replacing the usual expensive and cumbersome timbering, according to a Bureau of Mines report.

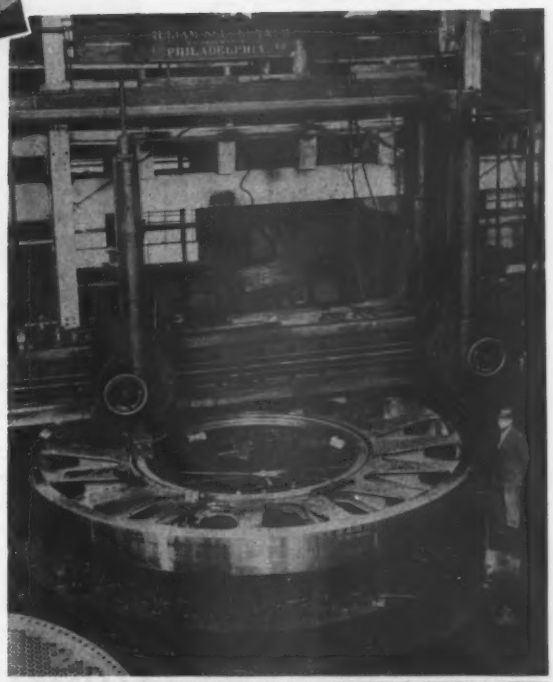
Seven years ago there wasn't a single coal mine employing systematic roof bolting, while today there are 604. An additional 117 mines producing metals and nonmetallic minerals now support their roof rock with bolts, which are inserted in drill holes and anchored. By binding together several thin rock strata to simulate a thick beam, bolts provide additional strength across a mine opening and greater safety for miners working underneath.

SLING CHAIN handling safety

SAFETY IN HANDLING of sling chains is being stressed by The National Supply Co. Charts have been distributed throughout the plant showing the safe working loads for the alloy chains used, and giving suggestions for using chains properly.

Here are a few of those suggestions: Keep chains free from twists, knots and kinks. Distribute loads evenly on all legs. Lift from center of hooks, never from point. Bull-rings and hooks must be stronger than the chains themselves. The principal cause of chain damage is overloading, by either underestimating the load being handled, or by hooking on to a part improperly.

MACHINING JOBS ARE GETTING BIGGER



Yes, The Modern Trend Is To Build It Bigger...

Only at Moore's will you find the variety of large machine tools to hurdle the problem of size.

1. Openside planer—72″x72″x24′ stroke 25′. 7′3″ under rail with rolling 39′ side table for wide sections.

2. Vertical turning and boring mill—swings 18′3″—clearance under rail 10′6″ (machining alloy steel ring gear).

3. Turning Compeb mill shell on 72″ swing x 39′ between centers. Heavy duty engine lathe. Lathe can be blocked up to swing 124″.

Many other machine tools are available to handle other large work.

Small work too, quantities one to a thousand can be machined at Moore's, quickly and with precision.

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THE COMPLETE INDUSTRIAL PLANT

Moore Machine Tools Are Available to You for Any Job...Large or Small

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MACHINING, GRINDING, FORGING, HEAT TREATING
PLATE–SHEET–PIPE FABRICATION, STRUCTURAL STEEL FABRICATION and ERECTION.

"NO SHUT-DOWNS WITH LUBRIPLATE"

—say HENRY & WRIGHT of Hartford, Conn.

"While waiting for delivery of one of our 25-ton Dieing Machines to do a particularly heavy job, a customer was trying to start production of a 10-ton machine. Even though it was lubricated with a conventional grease every eight minutes, the machine had to be shut down for bearings to cool during each coil run. Then, on our recommendation, he changed to a LUBRIPLATE Lubricant. With but two applications of LUBRIPLATE a day, the machine operated continuously except during change of coils."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

ASSEMBLY LINE horseshoe type

ESTABLISHMENT of a horseshoe-type final assembly line at the Boeing Airplane Co. plant in Renton, Wash., is aiding in keeping KC-97 Stratofreighter production costs at or below anticipated costs. The line doubles back on itself, permitting final assembly of aircraft without the necessity of moving personnel from place to place.

Fuselage panels, fresh from panel jigs, move into the line at one end of the horseshoe, and gradually grow into a complete airplane.

CLOSER LIAISON between business and research

A SPECIAL volunteer committee of top-flight industrialists and businessmen has been formed to weld an important service organization more closely with the business community.

A closer liaison between Denver Research Institute of the University of Denver, a non-profit, service organization, and firms which vitally need research to solve their engineering and scientific problems is the intent.

Among those forming the initial nucleus for the panel are: C. J. Abrams, Climax Molybdenum Co.; Charles Brokaw, U. S. Dept. of Commerce; Clem W. Collins, CPA; Clyde Epperson, Denver Wholesale Florists; John Gates, Gates Rubber Co.; Albert J. Gould, attorney; Andrew Riddle, Colorado Fuel & Iron Co.; Aksel Nielsen, Title Guaranty Co., and A. N. Williams, Sr., president, United States National Bank.

The Denver Research Institute has a research volume of more than $1,000,000 a year. Started on a small scale with a handful of ardent workers, the institute has since grown into the largest organization of its kind between the mid-west and West Coast, and now contributes substantially to the business development of the area.

Its associate director is Col. Victor C. Huffsmith, and heads of its research divisions are Dr. W. R. Jewell, mechanical engineering; Dr. Charles H. Prien, chemistry and chemical engineering; Dr. Thomas Zandstra, physics; Carl A. Hedberg, electronics; and James P. Blackledge, metallurgy.

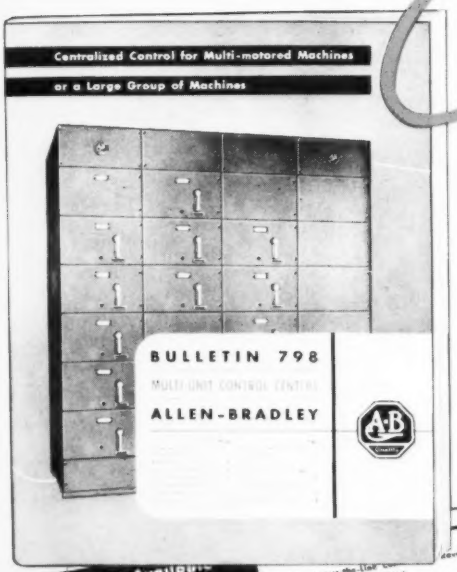
WHIRLWIND sales trip

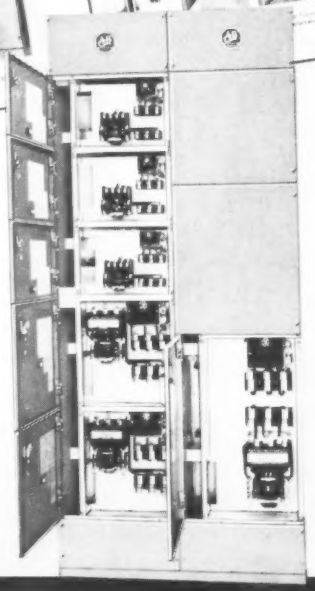
NORMAN W. F. KLEIN, director of exports for Morehouse Industries, and Super-Cold Corp., has left on a selling trip that will take him around the world in 90 days with stopovers in 70 countries. He will visit Hawaii, Japan, North, Central and South Africa, Central and South America and the major countries of Europe, the Near East, and the Far East to tell customers and prospects about the equipment by Morehouse and Super-Cold.

Centralize

YOUR AUTOMATIC MOTOR CONTROLS FOR NEATER, SAFER INSTALLATIONS

There is a decided trend toward the use of Allen-Bradley Multi-Unit Control Centers. They concentrate all motor controls for a group of machines . . . or for your entire plant . . . in one spot. They make a compact installation that is safer and neater than scattered groups of individual controls. Inspection is centralized for easier and better maintenance.





SEND FOR THIS 28-PAGE ILLUSTRATED BULLETIN

This idea-packed catalog of Allen-Bradley Multi-Unit Control Centers has 58 illustrations and 18 diagrams of intriguing interest to plant engineers. It portrays how interchangeable panels of starters, reversing switches, circuit breakers, disconnect units, relays, and other control devices may be combined . . . just like building blocks . . . to provide precisely the control you need. Shows how easily changes can be made to satisfy revisions in plant layouts. Write for Bulletin 798, today.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

4-53-M

A-B Quality

ALLEN-BRADLEY

BULLETIN 798 MULTI-UNIT CONTROLS

QUALITY

MULTI-UNIT CONTROL PANELS

EASY TO ADD
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to meet
Plant Requirements

Available with
Manual Disconnect Units
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Plug-in panels are ideal for continuous process industries which must be serviced while the bus is "hot." Fixed connection Multi-Unit Control Panels are popular for most industries.

CENTRALIZED MAINTENANCE

Centralized location of all motor controls promotes regular inspection, discourages tampering by unauthorized personnel, and does away with special mounting provisions so often needed for groups of starters. A-B Multi-Unit Control Centers can be installed more quickly than an equivalent number of separate starters, disconnect units, and accessories.

GREATER PLANT SAFETY

Not only do Allen-Bradley Multi-Unit Control Centers reduce the hazards of accidental personal contact with "live" switch gear . . . they also make possible the centralizing of motor controls in rooms far removed from hazardous gases, dusts, or fumes. They may even be installed out of doors in weatherproof cabinets. Send for Bulletin 798 for details.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

A-B Quality

ALLEN-BRADLEY

BULLETIN 798 MULTI-UNIT CONTROLS

QUALITY

PSYCHIC DEVICE for high speed jets

A UNIQUE new control that directly senses engine pressures and replaces complicated electronic equipment has been developed by Solar Aircraft Co. The tiny instrument simulates a miniature jet engine and has important applications on modern aircraft engines. A variety of industrial uses are being explored.

The simple, pneumatically-operated device computes by itself, under all flight conditions, exactly what the turbine discharge pressure should be, and at the same times notes any error, which is then signaled to the engine controls which make corrections.

PONDEROSA preservatives work for other woods

WESTERN PINE research workers have found that preservative treatments in common use for Ponderosa Pine woodwork will also work on many associated woods found in the Western pine region. Douglas Fir, White Fir, Engelmann Spruce, Incense Cedar and Larch all accepted preservatives in accordance with standards of the National Woodwork Manufacturers Association.

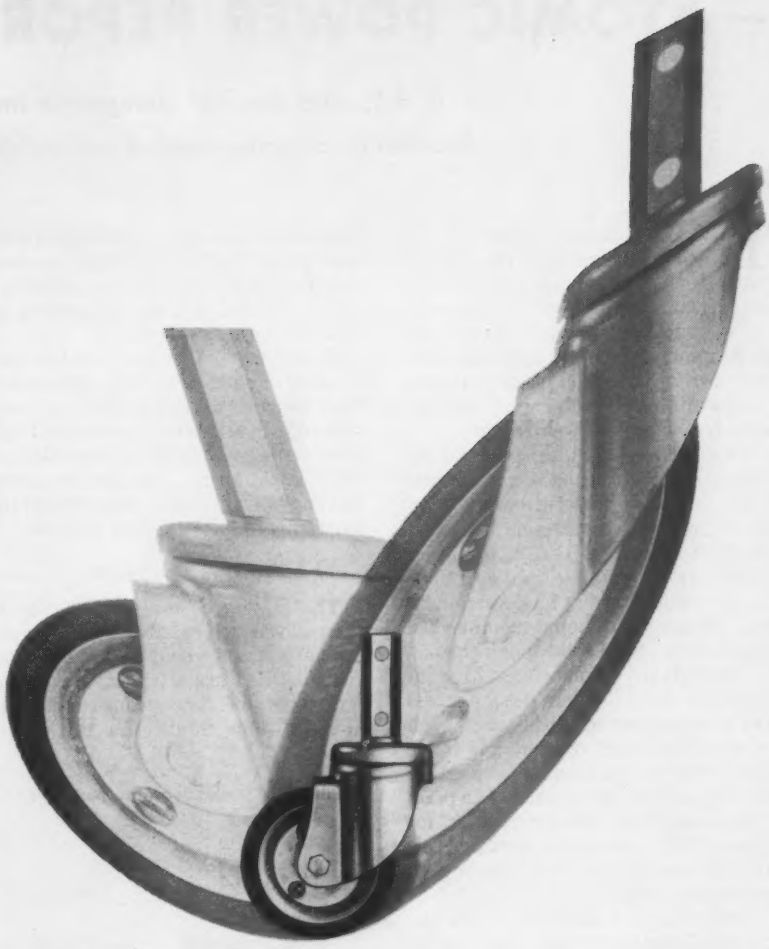
All woodwork treating schedules and specifications are based upon measurements of end penetration into sapwood, with all woods meeting the minimum penetration of 1½ in. as specified in the NWMA Preservative Treatment Standards.

INDUSTRIAL SURVEY research/sales

STATE of Washington Division of Industrial Research, assisted by the Bureau of Economics and Business Research, has conducted two surveys over the past year, to determine the ratio of money invested in research to total sales volume. These surveys, covering logging, mining, and quarrying in the State of Washington, were carried on by mailed questionnaires.

Results showed expenditures of the industries concerned with research are less than 1% of total sales. A ratio of 3-4% is considered justifiable in many industries.

Of the logging firms in the state, 1,456 were contacted, with returns indicating research expenditures are 0.6% of sales. Firms in mining and quarrying returned 223 usable questionnaires showing research expenditures of 0.8% of sales.



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1458 styles of Colson Casters cover swivel and rigid types; wheel sizes from 1 to 8"; cushion rubber, hard rubber and steel tires; ball, durex or plain wheel bearings; stems and mountings for every purpose. Colson Casters are serviced by engineers. Phone or write for information.

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— ATOMIC POWER REPORT RELEASED —

P. G. & E. and Bechtel determine immediate feasibility of water-cooled converter reactors

THE U. S. Atomic Energy Commission has released declassified versions of reports made by four separate teams of industrial representatives who spent a year inside the atomic energy program appraising the prospect for industrial participation in production of electric energy and fissionable materials from reactors.

One of these teams, composed of the Pacific Gas & Electric Co. and Bechtel Corp., directed their attention principally to types of reactors being actively developed by AEC laboratories.

As a result of these studies PG&E recommended that: (1) development and design of a liquid-metal-cooled fast breeder, with solid fuel elements, be undertaken promptly; (2) construction should follow design unless the development of other types, such as the liquid-fuel reactor, has made these plans obsolescent; (3) the AEC should continue development of a practical liquid-fuel breeder reactor for commercial construction, provided this type of reactor gives evidence of high economic promise.

Following is a summary of the declassified portions of this team's report to the AEC.

Rapidly increasing power demands and decreasing amounts of hydroelectric power available for development, make the prospect of atomic power increasingly interesting. Atomic power having big capital costs and low fuel costs, would be economically justified where it could operate at a high capacity factor and earn maximum power revenue.

California meets needs

Steam plant location requirements of circulating water supply, fresh water supply, and a proximity to load center can be met in California. In the case of a low pressure atomic power plant, which would have greater circulating water requirements than usual, it would be essential to locate near an adequate supply of cooling water.

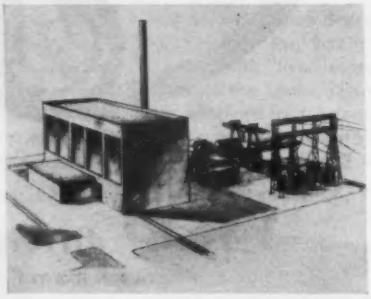
Previous experience with reactors indicates that the safety of plant and personnel is established; however, consideration must be given to the public hazard in the event a reactor catastrophe should occur. A reactor catastrophe is considered to be a cooling failure or a runaway of the reactor, resulting in the possible release of radioactive and toxic gases. Present site restrictions are based on the assumption that all radioactive material will be released as a cloud to the atmosphere.

In selecting one or more reactors for detailed studies, the two companies have concentrated their efforts on review of the various reactor designs that have been established as feasible by AEC laboratories. The detailed cost and engineering studies were limited to two representative types of reactors.

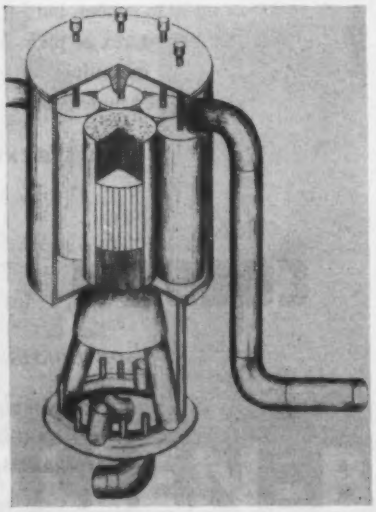
Water-cooled reactor

The first type was a water-cooled thermal converter reactor in which ordinary water would be used as the coolant, with heavy water serving as the moderator. The steam conditions at the turbine throttle for this plant would be 165 psig. and 375 degrees Fahrenheit.

A PROPOSED atomic plant, perspective.



CORE tank for sodium-cooled fast reactor



Essentially this reactor consists of an aluminum tank, with a multiplicity of aluminum tubes between tube sheets, serving as the container of the moderating heavy water. The fuel is placed in pressure tubes which extend through the core tank concentric to the aluminum tubes. Light water, the primary coolant, flows through the pressure tubes.

Cooling water enters the pressure tubes from an inner ring header, flows through the center portion of the core, through crossover pipes on the top of the reactor, and down through the outside pressure tubes into an outer-ring header. A water velocity of approximately 15 ft. per sec. provides adequate heat-transfer rates.

The reflector consists of demineralized light water surrounding the core tank and heavy water across the top and bottom of the core tank. The light water is contained in several segmental tanks.

Circulation of coolant

The primary coolant is circulated between the reactor and the steam generator by means of high-capacity circulating pumps. The moderator cooling system is designed to handle 7.5% of the total heat output from the reactor.

A thermal shield comprising 6 inches of iron, suitably ventilated, and a layer of material containing boron surrounds the reflector. The primary shield surrounding the reactor is completed by 8 ft. of ordinary concrete, as a study of construction costs reveals no economic advantage in the use of high density concrete. Penetrations through the concrete are held to a minimum.

Secondary shielding surrounding the steam generators, moderator coolers, and other auxiliary equipment is composed of 3 ft. of ordinary concrete so arranged that one of the four steam generators may be taken out of service for maintenance or repair without necessitating a shutdown of the reactor. Control of the reactor is effected by plates, located at intervals around the core tank.

The operation of this reactor requires six operators on a shift basis and in addition a janitor, laundry and

Who said this was Independence Day!

Tough luck, Joe, but the big Boss doesn't like it either!

One of the first things a maintenance chief learns is that many piping repairs must be done while the plant is shut down. That means holiday work, week-end work, overtime work—expensive work.

And soon he learns this: It's far thriftier to buy quality equipment and reduce maintenance, than to buy on price alone and increase the chance of trouble.

That's why so many plants choose Crane Quality valves and fittings. It's the way to assure longer valve life and fewer piping repairs. Yes, and a big help in avoiding those urgent, extra-cost holiday jobs. At today's maintenance labor rates, Crane Quality is even more the stand-out value with industry's thrifty buyers.

Crane Co., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

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BIG ORDER...

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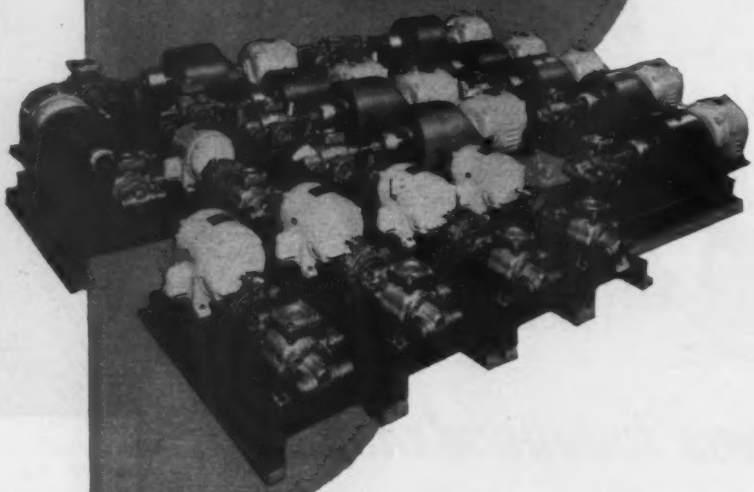


Big order, yes! And the BIG factor that prompted the selection of the fifteen Roper Series 3600 Pumps shown was *dependability.*

Dependability as only painstaking engineering, quality components, and accurate assembly can bring.

Dependability that serves your interests on both long and short runs—whether handling thick or thin liquids.

Roper Series 3600 Pumps feature hardened helical gears running in axial hydraulic balance, high lead bronze bearings, split ring packings and split gland, and adjustable relief valve . . . are made in 40 to 300 G.P.M. sizes — pressures to 60 P.S.I. Send today for Catalog 953 giving complete data on Roper pumps, or see your Roper distributor.

ROPER
Rotary Pumps

GEO. D. ROPER CORPORATION, Pacific Coast Office, Pump Division
2011 S. Santa Fe Ave., Los Angeles 21, California

other day personnel. Technical services include an engineer and a physicist on a shift basis, a chemist, junior engineer computers, and clerical personnel on day work.

Liquid-metal-cooled reactor

This fast reactor not only has advantages for a dual purpose installation, but also appears to have considerable promise in the ultimate nuclear-power industry. This reactor differs from the water-cooled type in several respects. In the fast reactor there can be no materials of low atomic weight to moderate or slow down the neutrons.

Since all materials have less tendency to absorb neutrons, the choice of structural materials is less limited. Stainless steel appears to be entirely suitable for use in this reactor. Exposure time can be lengthened and fuel handling costs correspondingly reduced, due to differences between certain nuclear constants for thermal and fast neutrons. Being a breeder type reactor, this reactor produces more fissionable material than it consumes.

The reactor core of highly enriched material is surrounded by a breeder blanket composed of either depleted or natural uranium. More than 90% of the heat production takes place in the core, consisting of an assembly of numerous stainless steel fuel elements. A reflector will probably be used to envelop the core, thus serving to decrease the critical mass and also to limit the heating outside the core.

All heat is removed from the reactor core and blanket by liquid sodium flowing at a high velocity (approximately 30 ft. per sec.). Provision must be made in the cylindrical steel vessel containing the core and reflector, for the circulation of this liquid sodium, to permit refueling, and for the control mechanism. Primary coolant is pumped to two intermediate heat exchangers, entering at 900 deg. F., and returning to the reactor at 600 deg. F.

Secondary coolant sodium entering the steam generators at 850 deg. F. produces superheated steam at 500 psig. and 750 deg. F. Two steam generators are required, each producing 800,000 lb./hr. Steam is delivered to the turbine throttle at 485 psig. and 750 deg. F.

Estimated costs

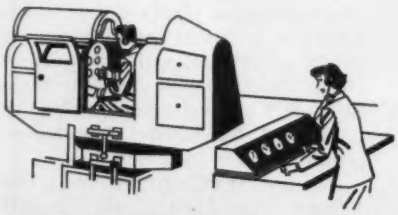
The following are estimated capital costs for dual purpose reactors:

For the water-cooled thermal reactor: site $700,000; total improvements to site $2,100,000; total reactor costs $24,350,000.

For the sodium-cooled fast reactor: site $700,000; total improvements to

MANY INDUSTRIES BENEFIT WITH AMERICAN BLOWER AIR HANDLING PRODUCTS

Need corrosion-resistant fans for process work? Equipment for dust or fly ash collection? Do you have a specialized or complicated ventilating problem? Read how American Blower Air Handling equipment can help you.



PRECISION TESTING

Long before aircraft instruments are accepted for use, they are thoroughly evaluated in special laboratories. And in the testing of precision instruments, as with many other processes, close control of temperature and humidity is vital. Recently one of the newest and largest instrument laboratories selected American Blower equipment for heating, ventilating and temperature control — a fine compliment not only to American Blower quality but also to our own research and testing methods.

DO AWAY WITH DUST

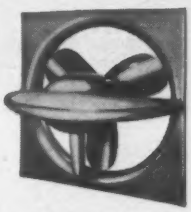
If you have a problem involving dust or fly ash collection, American Blower will be glad to help you. We have a wealth of experience in this field which covers both dust and fly ash removal in industry and public utilities as well as the recovery of valuable materials from air. In addition to local, on-the-spot assistance from our branch office personnel, a modern fully equipped research laboratory is maintained in Detroit to serve you.

FUME REMOVAL

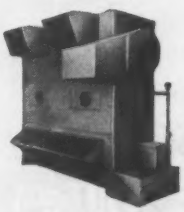
If you're planning to enlarge your metal-processing facilities American Blower offers special fans to handle the corrosive fumes, gases or vapors. For example, some corrosive gases are necessary to process work and must be circulated in the system with corrosion-resistant fans. In other cases, fumes and gases which affect the health and comfort of employees must be safely and effectively removed.

Whatever your requirements American Blower heating, cooling, drying, air conditioning and air handling equipment will improve over-all comfort and efficiency in your business. For specific information, phone or write our nearest branch office.

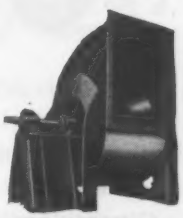
Unit Heaters



Ventura Fans



Air Conditioning Equipment



Industrial Fans

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YOUR BEST BUY **AMERICAN BLOWER** **AIR HANDLING EQUIPMENT**

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS

★ No. 4207J Loadstar wheel, cutaway showing felt and steel seal.

★ Complete Loadstar assembly with TB-4351 brackets and X-458 chain.

★ Here is a completely new trolley conveyer designed to meet the requirements of the most exacting purchaser. A top-quality precision wheel, the No. 4207 Loadstar is the heart of this rugged newcomer to the 4" trolley conveyer field. Five years of research and development by Mathews Engineers are behind this exceptionally fine trolley which is recommended for the overhead conveying job demanding stamina and continuous trouble-free performance. Write for Bulletin LS1, announcing and describing this new trolley.

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Engineering Offices and Sales Agencies in Principal Western Cities

site $2,100,000; total reactor costs $33,100,000.

For the water-cooled thermal reactor plant the annual operating costs would be $1,220,000, while the total estimated annual operating costs for the attendant power plant would be $1,580,000. In contrast the sodium-cooled fast reactor plant would cost $1,055,000 per year to operate, while its power plant would cost $1,520,000 a year to operate.

Costs measured

Cost studies, based on the liquid-cooled fast reactor breeder, have been made to obtain a measure of the economic feasibility of nuclear power. In order to determine the cost of power for this reactor, certain assumptions were necessarily made.

The atomic power plant and the fuel fabrication plants will be amortized over a 20-year period. Financing would be private, and no inventory charge for fissionable material would be made. Core fuel exposure would be unchanged, but blanket material exposure would be increased.

The costs in mills per kw.-hrs. are as follows: Case I represents the dual purpose reactor operating as a power reactor and indicates current costs of producing atomic power as 12.5 mills. Case II represents operation of the same reactor for power only, after it has been completely amortized, indicating how a salvage value might be determined for the plant as a power producer only. Cost 3.6 mills. Case III represents costs which might be associated with a similar type reactor constructed and operated in the future for power only. Cost 5.5 mills. Case IV represents the conventional steam power plant. Cost 6.0 mills.

Consideration was given to a fast reactor of the liquid-fuel type, but the present stage of development does not permit a cost study to be made. As a result of the one-year study it was concluded that design and construction of reactors to produce fissionable materials and power is now technically feasible.

Can be predicted

The water-cooled thermal type of reactor has reached a point in engineering development that permits its construction and operating costs to be predicted with a fair degree of accuracy. Detailed design of such a reactor could be started promptly; and, if the primary emphasis is placed on plutonium production at the earliest possible date and for a definite production, this type of reactor would be very attractive.

The liquid-metal-cooled fast reactor

What makes a steel sheet Good?

The answer, of course, is that a steel sheet is good only when it does the job you want it to do.

Columbia-Geneva sheet quality is rigidly controlled, from raw ore to finished product, by metallurgists and other trained technical personnel using the most advanced testing methods. At every step Columbia-Geneva steel sheets are designed to meet your most exacting specifications. And from start to finish they are produced in the most modern mills in the West.

Right now, of course, sheet steel is still in critical supply. Columbia-Geneva is doing its best to help overcome the shortage of sheets for civilian needs, but still cannot begin to fill all orders.

Yet what about the time when more and more tons of sheet steel will be available to fill your needs . . . when you can pick up your phone and order all the sheets you need from any of several steel producers?

We hope that as sheet steel becomes more readily available, you'll continue to look first to Columbia-Geneva, the West's largest steel producer.

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Division United States Steel Corporation, San Francisco

UNITED STATES STEEL

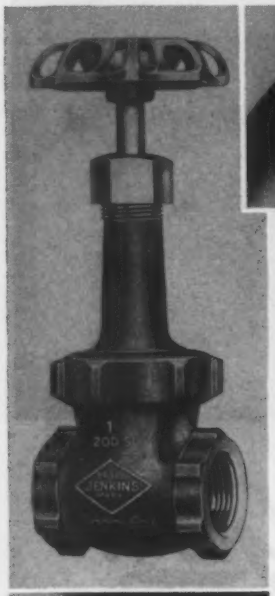
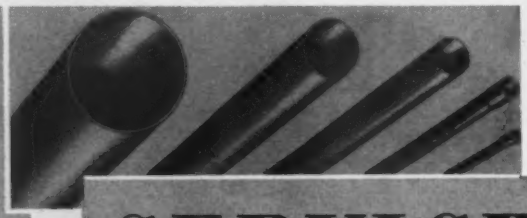
has the advantage of conserving the existing supply of uranium and promises to be adaptable to high-pressure and high-temperature steam conditions found in present day power plants. This makes it more attractive as a power producer. The engineering background is sufficiently developed to justify proceeding with a program for design and construction even though certain development work must be continued on into the design period. The liquid fuel fast reactor appears to have the greatest possibilities of low cost power production. However, a great deal more developmental work remains to be done before design and construction can be considered.

Estimates do not indicate that the sale of power from a dual purpose reactor will reduce the cost of plutonium production substantially; however, they do indicate that the sale of power will more than justify the cost of the power generating equipment in a dual purpose installation.

Economically sound

Therefore, it is economically permissible under present plutonium demand and cost conditions to build a dual purpose reactor that may have continuing economic value as a power producer even after the plutonium demand is over.

Company officials of P. G. & E. estimate that continuing technological development of atomic reactors, combined with the decreasing availability of hydroelectric power available, will prompt the design and construction of an atomic energy power plant, to augment the existing public utility system, within a general period of from five to fifteen years.

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FAST FOOD SERVICE for your plant

AIRESEARCH Manufacturing Co. of Arizona has received an award for highest attainment in food service. A modern efficient employee cafeteria was built in 1951, occupying 6,600 sq. ft. and seating 240 people.

Integrated paddle and table combinations have indvidual places for eight to ten diners. Entrance to the dining area is through two single aisles on opposite sides of the room, which have the effect of establishing a flow pattern leading the diner past the silver and tray racks, the food counters and then into the dining area. "L" shaped serving counters are designed to serve 10 persons a minute. Custom built counters of stainless steel include a two-deck salad tray, steam tables, and two coffee urns.

Last station on the serving line is occupied by the checker, who serves hot and cold drinks. Exit from dining area is through a center aisle which takes the diner past the cashier at the central exit door.

CANNERY WASTE disposal methods

MANY screening operations are operating in a manner resulting in a negligible loss of solids to sewers and streams; however other installations using the same types of equipment are inefficiently operated, spilling large quantities of waste into bodies of water, the Pollution Control Commission, State of Washington, reports.

The greatest loss of solids at the screen to the sewer is from one of the following causes: (1) improper size screen openings, such as ⅛-in., ¼-in., ½-in. mesh; (2) screens out of repair; (3) improperly adjusted screens, resulting in flooding; (4) too much space between plant sewer outfall and screen, and between screen and elevator, causing loss of solids at these points.

"TINLESS" TIN CAN now in production

A COMPLETELY tinless tin can for motor oil is now in mass production at American Can Company's Oakland and Los Angeles factories. Development of the all steel can was accomplished by eliminating the traditional side seam solder composed of an alloy of tin and lead—both strategic metals. Replacing the solder is a thermoplastic cement which establishes a strong bond between the layers of steel.

The tin-free can assures the petroleum industry, distributors and car owners that no future world crisis, cutting off tin sources, will interrupt the supply of cans which help package over 300,000 gallons of motor oil annually.

A feature of the can is its fully-lithographed body which provides additional protection against corrosion and oxidation during outside display. The cemented side seam is an outgrowth of Canco research program, which introduced the motor oil can in 1935.

14 NEW SCHOLARSHIPS for engineering students

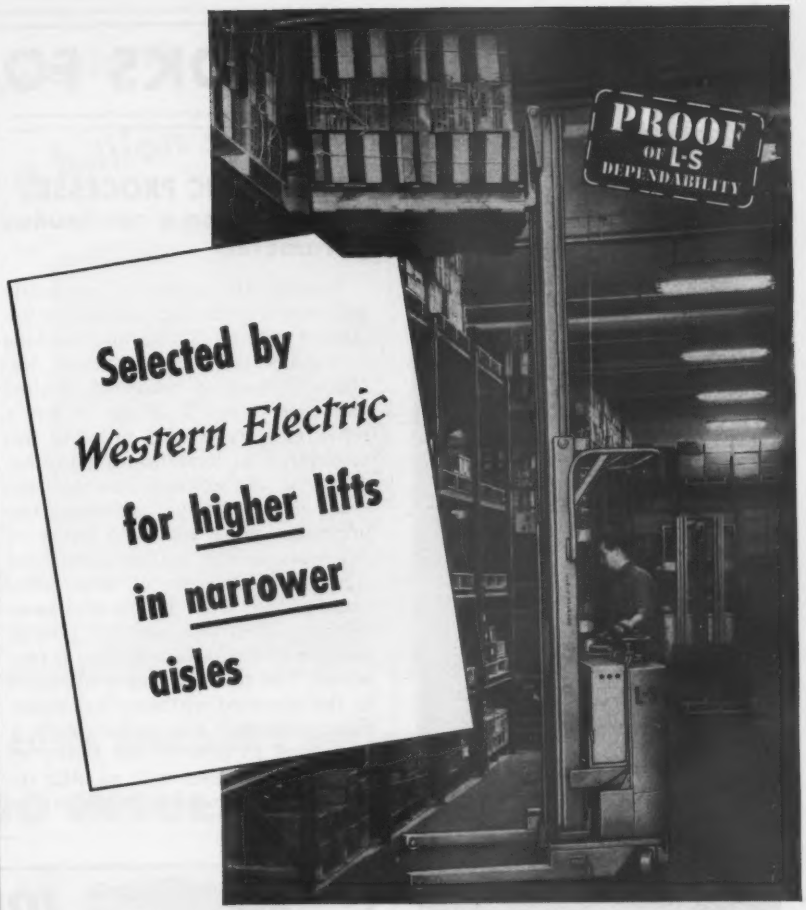
ELECTRICAL and electronic engineering students have a chance to win one of 14 new scholarships established at Pacific Coast universities and colleges by the 140 member-firms of the West Coast Electronic Manufacturers' Association.

The new scholarships will range from $600 to $800 each and will be awarded by eight educational institutions to encourage first and second-year students and junior college transfers to enter engineering. The scholarship fund was established through, and will be maintained by, voluntary donations from association members.

TURBOJET POWER for future helicopters

JOHN B. NICHOLS, assistant chief of propulsion at Hiller Helicopters said that the turbojet, now used to power high speed fixed wing aircraft, may become the best engine for large helicopters.

In a paper delivered before the American Helicopter Society at its annual forum, Nichols said that after considerable development to adapt rotor tip-mounted turbojets to helicopters is completed, better performance and efficiency should be obtained than is now possible with any other helicopter propulsion system in existence.



How would you like to cut down your wasted floor space and, at the same time, increase your stacking heights?

Western Electric Company Planning Engineers are doing just that. In many of their Distributing Houses, aisles have been narrowed to 7′ wide and stacking heights increased to 176″. Before proceeding, however, it was necessary to find a 3000 lb. capacity Fork Lift Truck to meet these exacting requirements.

After many exhaustive tests, Western Electric engineers tried Lewis-Shepard SpaceMaster Model "M's". The "M's" gave the truck stability required in their high-stacked, narrow aisle warehouses.

High stacking stability means faster, more efficient operation, of course, but even more important, it assures safer handling.

Why is the Model "M" more stable? An exclusive L-S design has made it possible to introduce two rugged stabilizing casters under the load carrying frame of the truck. These two additional points of support distribute the weight and greatly increase stability under high, heavy loads. Rigid channel masts are another important high lift stability factor.

COMPARE THE FACTS! Ask for Riding Type Electric Truck Comparison Chart and prove to yourself that Lewis-Shepard is your best buy.

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CLEVELAND 15.....2256 Midland Bldg.
DETROIT 26.....1567 Lafayette Bldg.
HOUSTON 2.....2164 C & I Life Bldg.
LOS ANGELES 17....1570 General Petroleum Bldg.
NEW YORK 6.....3334—165 Broadway Bldg.
PHILADELPHIA 3.....1666-1700 Walnut St. Bldg.
PITTSBURGH 19.....Alcoa Bldg.
SAN FRANCISCO 4.....1578—200 Bush St.
SEATTLE 1.....1369 Henry Bldg.
TULSA 3.....1667 Hunt Bldg.

BOOKS FOR INDUSTRY

STOCHASTIC PROCESSES depending on a continuous parameter

Because the study of stochastic processes is becoming increasingly important with its applications reaching into many branches of science, National Bureau of Standards invited Professor Henry B. Mann to give a series of lectures and to write this monograph on the subject. Publication gives the fundamental concepts and some of the principal theorems; two processes known from the theory of Brownian motion are discussed; and statistical estimation of these processes is dealt with. Differential processes are discussed, and the Fourier analysis of stochastic processes is presented. This small volume is addressed to the educated mathematical statistician, although the author made a real effort to develop the theory of stochastic processes with as little resort to abstract measure theory as possible. National Bureau of Standards Applied Mathematics Series 24, $.30 per copy. Order from Government Printing Office, Washington 25, D. C.

ALL ABOUT A CHANGE of pace in industrial drafting

Proven results of first major change made in industrial drafting practice in over fifty years are: less time, lower costs, greater efficiency, and more effective. Practical approach to achieving these aims is contained in *"Simplified Drafting Practice,"* a new book by William L. Healy and Arthur H. Rau of General Electric Co. Volume is based on a comprehensive survey of GE's drafting practices. Here it was found that drafting could be stripped of its frills without losing either clarity of presentation or accuracy of dimension. Book is intended for methods and procedures men, office managers,

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Gear making is a specialist's job. Johnson Gear standards are built around the ability to skillfully produce gears to exacting American Gear Manufacturers' Association specifications. The Johnson Gear organization has the technical "know how" and experience to build carefully and dependably a finished product that will give noteworthy performance.
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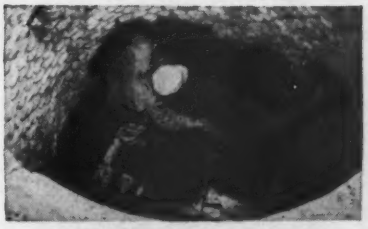
HERE'S THE ONLY insulating fire brick that withstands a full 3000F. It's highly efficient both as an exposed refractory lining or as back-up insulation. And JM-3000 is only one of six types of Johns-Manville Insulating Fire Brick made for these applications. All provide long-life insulation. All are light in weight, have low conductivity, high structural strength. These properties permit thinner furnace walls—yet you can achieve important fuel savings and increased production, because J-M Insulating Fire Brick assures quick furnace response.

Sil-O-Cel* Insulating Brick is another outstanding J-M fuel-saver . . . a high load-bearing brick for back-up insulation behind refractory linings. It comes in three types, for service through 2500F—makes it possible to reduce the necessary thickness of refractory linings as much as one-third.



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Johns-Manville refractories meet every need for castable, troweling and gunning applications for temperatures through 3000F. *Firecrete** is used to cast special shapes of all kinds. It is ready for use within 24 hours, has negligible shrinkage and high resistance to spalling. *Blazecrete** is used to build and repair furnace linings. When gunned, it adheres readily with a minimum of rebound loss. When slap-troweled, it eliminates laborious ramming and tamping.

Save Fuel with J-M Aggregates and Fills

These lightweight insulations are used as fills to conserve heat in irregular spaces where other forms of insulations cannot be economically applied. They are also used as aggregates for mixing with other materials to form insulating refractory concrete.

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Send for your free copy! This new booklet IN-115A gives full details about J-M insulating materials for service through 3000F. To find out how they can help cut your fuel costs, simply mail coupon.

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A new catalog of isotopes, both radioactive and stable, produced by Oak Ridge National Laboratory, Oak Ridge, Tenn., is now available, replacing a previous edition published by Atomic Energy Commission in March 1951. Catalog, which sells for $1.00 per copy, or information about ORNL-produced radioisotopes, may be obtained by writing to Carbide and Carbon Chemicals Co., Oak Ridge Nat'l Laboratory, Radioisotope Sales Department, P. O. Box P, Oak Ridge, Tennessee.

NEW EDITION of air conditioning manual

A revised edition of Trane Air Conditioning Manual is newly published by The Trane Co., manufacturers of heating, air conditioning and heat exchange equipment. A new fan chapter is added to book to cover fan application and selection, basic fan laws and duct design data and nomenclature. Text is illustrated with drawings, photographs, charts and graphs. Problems ending each chapter show practical applications; answers are given in a separate section. Manual can be purchased from The Trane Co., La Crosse, Wis., for $5.00. Fan chapter is available separately for $1.00.

A COMPANY GUIDE to effective stockholder relations

This booklet is a concise, authoritative manual of objectives and methods for ensuring a flow of accurate, complete company information to the financial community and the investing public. Written by a group of security analysts with contributions by corporate executives and regulatory agency representatives, it covers the subject of stockholder relations from the viewpoint of the invester-owned corporation, with attention to the role of the security analyst and federal law implications. Published by American Management Association. Price $2.00 for non-members, $1.50 for members.

PRODUCTIVITY and probability

Here is an original and stimulating book on time study and incentives, published in England. One feature which should interest the American reader is the treatment of interference, or waiting time, on semi-automatic machines when one operator has charge of several. The author, T. F. O'Connor, claims to have a solution of general validity, and further puts his results in the useful form of production units achieved rather than in the negative form of production time lost (interference). Published by Emmott & Co., book may be obtained from author, 2817 Otis Drive, Alameda, Calif., for $1.50.

SUCCESSFUL LABOR relations for small business

This new McGraw-Hill book by James M. Black and J. George Piccoli is based on actual industrial relations problems encountered in hundreds of smaller companies (1,000 or fewer employees). It offers sane recommendations and specific techniques to management men and foremen in such companies who want to handle their labor relation problems wisely. Book is available from McGraw-Hill, 327 W. 41st St., New York 36, N. Y., for $6.00.

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AUGUST 5, 1952

MARCH 20, 1953

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UNRETOUCHED PHOTOGRAPHS

The Broadway Market, in Redwood City (Calif.), is but one of many hundreds of amazing EVIS installations. All over the United States EVIS Water Conditioners are conquering scale in practically all types of refrigeration equipment. The top photograph was made at the time the Evis was installed . . . a quarter-inch rod was driven through the tubes . . . two weeks later much of the scale was sufficiently soft to be prodded out with a small diameter tube . . . the condenser was not opened again for six months . . . the bottom photograph clearly shows what the EVIS had accomplished.

• • •

If Evis Conditioners are not yet available in your locality . . . phone or write your nearest Evis Regional Distributor for complete information.

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As one of several types of ANACONDA power cables, DURASHEATH is available in all sizes, single or multiconductor, copper or aluminum, from 600 to 15,000 volts. It is thoroughly dependable for industrial plants, railroads, series or multiple street lighting, traffic control, and airport† lighting, residential primaries and secondaries, as well as for such uses as Type USE cable for underground service entrance. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

*Reg. U. S. Pat. Off. 83312

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HELPFUL LITERATURE

for the plant operator who wants to keep informed

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1

Agricultural fertilization valves described and pictured

A well designed 16-page brochure by *Henry Valve Co.* gives concise, workable information on firm's newly developed line of ammonia valves and steel fittings for soil fertilization and industrial equipment. Pictures, diagrams, and copy, plus specifications and order numbers in chart form will give you a good idea of each product. 801

2

Learn about lathes

A new 12-page booklet featuring *South Bend Lathe's* "light ten lathe" is now ready for distribution. Both bench and floor type lathes in quick change gear and toolroom models are shown. Outstanding features are well illustrated. Complete specifications are given for various models covering capacity, feeds and speeds as well as dimensions and shipping weights. 5216

3

New data card on tubing steel —with applications

An alloy tubing steel widely used in elevated temperature service, B & W Croloy 5 (4-6 per cent chromium, ½ per cent molybdenum), is discussed in a new technical data card issued by Tubular Products division of *The Babcock & Wilcox Co.* Included are data on mechanical properties, creep strength, physical properties, welding, fabrication and heat treatment.

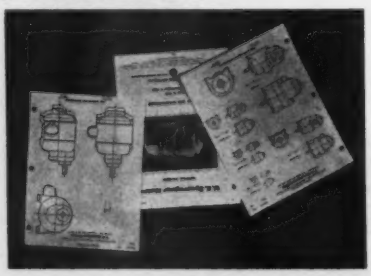
4

Roller chain and sprocket info.

A new 54-page book, published by Baldwin-Duckworth, division of *Chain Belt Co.*, describes inherent advantages of roller chain and illustrates all popular sizes of Baldwin-Rex roller chains. Sections on selection of standard roller chain drives and on stock sprockets . . . their characteristics and prices will be of interest to all who buy, select, and maintain roller chain and allied equipment. 52-1

5

Scale drawings of gearmotors offered



Scale drawings of U. S. Motors Syncrogear line are now available to layout draftsmen, designers, engineers and architects. Drawn in a simplified style, but to exact scale, these drawings are designed to be inserted under a layout of a machine or other equipment and traced in proper size and position. *U. S. Electrical Motors, Inc.*

6

Pocket guide to better shipping procedures

Packaging engineers, shipping superintendents, traffic managers, works managers and others will welcome this latest revised "Guide to Better Shipping Catalog" issued by *Signode Steel Strapping Co.* Latest information on pallets, bundles, crates, in production line packaging and newer loading techniques is given. Illustrated is a wide selection of strapping tools and equipment. No. 15

7

About mild steel electrodes

A 15-page brochure, offered by *Metal & Thermit Corp.*, presents following information on mild steel electrodes: general description, applications, physical properties, chemical analysis of deposit, standard sizes and packaging, recommended currents. Electrodes covered are: Type R, Type A, Genex M, Type U, Alternex, Type HTS and Type FHP.

8

A paper on "High Vacuum Vapor Pumps"

In his paper on this subject, author Dr. Richard B. Lawrance, director of Applied Physics department at *National Research Corp.*, discusses many characteristics of high vacuum vapor pumps such as: lowest obtainable pressure, volumetric speed, inlet pressure, throughput, limitations of high inlet pressures and maximum forepressures. He also discusses a graphical presentation of these quantities which permit correlation for industrial use.

9

Wiring diagram bulletin for AC across-the-line starting switches

A 24-page wiring diagram bulletin, describing uses of Allen-Bradley bulletin 709 magnetic across-the-line starter can be applied, is now offered by *Allen-Bradley Co.* Here, in one compact bulletin are illustrated both wiring diagram symbols and line diagram symbols, and wiring systems for various applications.

10

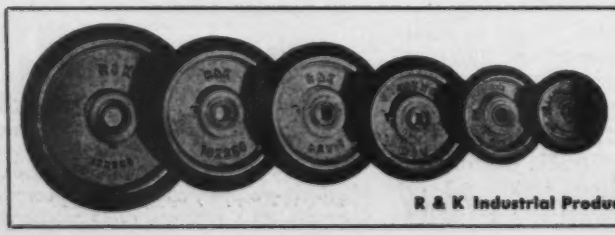
Seamless tubing handbook

"Ostuco Tubing" is an 8-page illustrated booklet listing applications and typical specifications for such tubings as mechanical seamless, aircraft seamless, welded mechanical, and welded pressure types. Numerous shapes to which tubing may be forged and fabricated are pictured. *The Ohio Seamless Tube Co.*

11

Record your weights in print

Literature on *Detecto Scales, Inc.'s* weight printer is free for the asking. In 12 pages you can learn about why



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this device was developed, how it operates, what it will do, and its special features. A series of charts will show you capacity and ordering data on various models.

12

Know your zeolite water softening method

A new bulletin on principles and details of zeolite water softening, is an addition to literature on ion exchange which will be particularly welcome to engineers of power plants, chemical plants, municipalities, general industrial plants, and plants using special processes in which soft water is a necessity. *Graver Water Conditioning Co.*

13

Case study report on a counterflow heater

Here is how a manufacturer of porcelain products utilizes a conventional warm-air space heater to furnish 200 deg. F. air for a direct-heated process drier. A four-page folder gives details of installation and tells how this method produces higher quality parts as well as increasing production. *Dravo Corp.* 560-54

14

Information released on production planning system

A four-page, two-color brochure describing production control system at Pyle-National Co. of Chicago, is newly released by *Diebold, Inc.* This national manufacturer of office records systems, protection and microfilm equipment and hollow metal products, installed Pyle-National's system which is housed in Diebold's V-line trays. Full story is outlined in these pages.

15

Bulletin on blast cleaning in malleable foundries

How airless blasting can be used to bring about sizable savings is shown by a number of case histories presented in a new bulletin by *American Wheelabrator & Equipment Corp.* Various types and models of airless blast cleaning equipment used in malleable foundries are illustrated. Machines show range from tumble-type for small compact parts to table-type for parts with pockets, recesses, and high vertical sections.

16

Lane County, Oregon on review

A thick, ninety pages of information about Lane County, Oregon, will give readers a pretty good idea of what that area offers. A run-down of table of contents brings up these broad categories: basic economic facts and

Store little boxes, big cartons—anything. Supreme Steel Shelving is composed of standardized stock parts which may be quickly rearranged to suit your merchandise. You can change the shelf height, add doors or drawers. It's fully adjustable!

Low priced, permanent Supreme Steel Shelving is rigid, adaptable, easy to erect. It is an investment that pays off many times over.

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- Small Parts Drawers
- Tool Room Enclosures
- Work Benches

trends; factors in economic growth, industry, agriculture; and recommendations. Industries suited to Lane County are enumerated. Maps and charts are included in text. *Lane County Development Committee.*

17

Brochure on safety may save lives

Occupational Safety Service Guide provides company safety directors with a complete, colorful catalog of accident prevention aids available from *National Safety Council.* Tools needed to build plant safety programs plus training aids available for instructing supervisors and workers are all listed. No. 2.1

18

Flotation and flotation agents described

Considerable new information on use of RADA (Rosin Amine D acetate) as a collector for silica and silicate minerals is included in revised edition of a technical booklet on *Hercules Powder Co.'s* flotation agents. Booklet includes a table giving pertinent shipping information about all of Hercules' products for flotation. In table, each product is described according to type, per cent concentration as shipped, appearance, type of container and approximate weight.

19

Constant voltage power supply for welding can save money

A folder from *Glenn Co.* will give you a run-down on company's constant voltage welding. A brief specification chart on back page presents: rated output, output voltage range, voltage adjustment, duty cycle, input voltage, recommended fusing, efficiency, etc.

20

Words on windows

A 32-page booklet shows walls that are windows and windows that are walls. Diagrams and text explain structure, and ensuing advantages. Photographs show windowalls in actual use. *Anderson Corp.*

21

A modern answer to daylighting problems

A fine folder from *Libbey-Owens-Ford Glass Co.*, Corrulux division tells how and why you can save up to 60% on daylighting your corrugated metal or asbestos beltings. Back page gives physical and chemical properties with a product specification chart on Corrulux.

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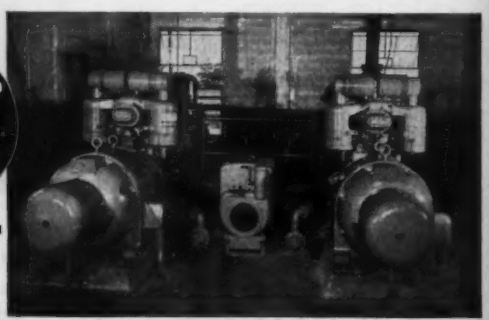

Starting Power Is Important...
provided by a WISCONSIN HEAVY-DUTY Air-Cooled ENGINE

Big diesels deliver standby power protection at this Florida refrigerated citrus warehouse . . . one of the largest in the South. But every bit as *vital* is the role of the 4-cylinder Wisconsin Heavy-Duty Air-Cooled Power Unit. *It starts the diesel, if electric power fails.*

Wherever there's a 3 to 36 hp. assignment, you can look for and usually find a Wisconsin Engine delivering dependable power to fit the job and the machine. Wisconsin Engines offer *the widest margin of usable power.* These engines *deliver* and *hold* the horsepower shown on the horsepower curves. Heavy-duty construction and service features, plus easy, positive starting, fool-proof air-cooling and thrust-absorbing tapered roller bearings at both ends of the crankshaft *add up* to reliability *plus.*

Complete your data file with facts about full line of WISCONSIN 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A 7420-½

22

Hefty reference for your steel library

Green-Penny Co., distributor of industrial and materials handling equipment and building specialties, now puts out a giant catalog, complete with index dividers, of its various major lines. Companies given space include: *Abell-Howe Co., Angle Steel, Inc., Borroughs Manufacturing Co., Challenge Mach. Co., De Luxe Metal Furniture Co., Green-Penny Co., Hilmar, Inc., Rack Engineering Co., Service Parts Systems, Inc., Standard Pressed Steel Co.*, and *Supreme Steel Products, Inc.* Limited number of catalogs are available. Yours will be delivered by a G-P representative.

23

On calculating counters

A condensed extract of a larger book presents Irion & Vosseler counting devices both by picture and specification. Subjects covered include: hand speed indicators; hand tally, revolution, stroke, meter and yardage, and predetermining counters; electromagnetic counters for remote indication; counters with printing device; and sheet counters for printing works. Distributor is *Presin Co.*

24

Hole punching information published

Ninth edition of catalog "C" describes and illustrates Wales Types C, E, and EJ hole punching units which are developed especially for punching holes in angles, extrusions, shapes and sheets. Specifications and diagrams clearly illustrate units and accessories —their uses and characteristics. *Wales-Strippit Corp.*

25

Worm gear reduction unit ratings

A 36-page booklet devoted primarily to horsepower rating tables, presents power transmission capacities of various sizes of Cleveland worm gear reduction units. Material also includes dimensions of various types presented in diagrammatic form. A run-down of types AT and RT is given on several pages at back of book. *The Cleveland Worm and Gear Co.* 130

26

A digest of motor controls

The Clark Controller Co. has an 86-page booklet giving an abridged listing by charts, tables, pictures and text of Clark products. Function is to serve as a quick reference guide and price list for more commonly used types of electrical control. A list of Clark district offices appears on back cover.

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Send free booklets and more information on new products listed under circled key numbers:

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41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
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27

Book lists for special metal problems

The International Nickel Co., Inc., offers two lists—A and B—of publications dealing with various metals. List A is concerned with nickel alloy steels, stainless steels, nickel cast irons, nickel brasses and bronzes and plating. List B encompasses R, K, KR, and S monel, duranickel, low carbon nickel, inconel, inconel X and incoloy. In case your own metal problem is not covered in this literature, INC offers to help you solve it if you will write down an outline.

28

Drum transfer pump handbook

Complete catalog of specifications and applications of new air-operated drum transfer pump. Handles extra heavy greases, pastes, as well as lighter, less viscous substances. It also carries performance graph for reading output or delivery of Fast-Flo pump for fluids or pastes of various viscosity. *Gray Co., Inc.*

29

Stainless steel wire applications

A 20-page booklet of technical data on application of stainless steel wire is recently published by *Allegheny-Ludlum Steel Corp.* Tables of physical properties, corrosion resistance, and analysis are included to help readers in considering various types of steel wires. A discussion of principal uses covers cold heading, weaving, heat resisting belts, rope, spring wire, slide forming, welding and winding.

30

Technical bulletin on polyester applications

A technical bulletin containing up-to-date information on physical, electrical, and chemical properties of "Mylar" polyester film, and suggested applications, is newly issued by *Du Pont de Nemours & Co.* film department. Bulletin runs 17 pages, complete with charts, diagrams, and tables. It compares Mylar's physical properties with those of other Du Pont films—cellophane, polyethylene, and acetate. 1-2-53

31

Power transmission chains and sprockets in print

Powers Manufacturing Co. enters field of manufacturing as a completely new organization with a plant designed and built for production of a comprehensive line of power transmission chains and sprockets. To supply you with reference material about these products, firm has new, 74-page guide embracing dimensions and list prices plus general specifications.

USE RIP-OUT POSTCARD for more information on products introduced this month.

NEW MATERIALS & EQUIPMENT

32

An innovation in industrial trucks

Lift trucks are becoming style conscious. And busy setting pace of fashion is "Dynamotive," newly introduced gas powered industrial truck with electric transmission. Dynamotive was designed by Col. Alexis de Sakhnoffsky, widely known industrial and sports car stylist. Truck features electric, infinite step transmission, eliminating need for torque converters, clutch, overdrive mechanisms, and gear shifting. *Automatic Transportation Co.*

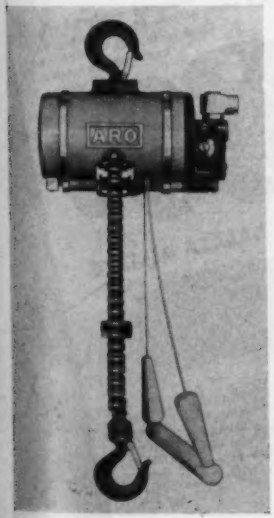
33

Power-up with a high-powered engine

Model 935 is a truck and industrial six-cylinder engine in which is incorporated many engineering advances over earlier models. It can be built to operate efficiently on gasoline fuel of available octane rating or on LPG fuels, such as butane or propane. Overall dimensions are: length 62¼ in.; height 48 in.; width 30½ in. With a 5¾-in. bore and 6-in. stroke, displacement is 935 cu. in. *Hall-Scott Motor Division, ACF-Brill Motors Co.*

34

Half-ton loads lifted with speed and safety



Here is a light-weight air hoist, weighing 27½ lb., having a lifting capacity of 1,000-lb. loads at 40 ft. per minute. Hoist is a roller chain type, powered by rotary vane air motor. Hoist meets requirements for explosion-proof operation. It has safety snap hooks, top and bottom; adjustable safety stops on chain to limit lift and descent; and a safety brake which automatically locks when control is released. Its standard lift is 8 ft. Minimum hook to hook distance is 13¼ in. *Aro Equipment Corp.*

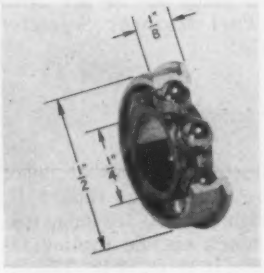
35

For easy lubrication of conveyor wheels

Alemite lubricator will tone-up your conveyor trolley wheels in a way that is automatic, certain and safe. It delivers a pre-set, constant shot of either oil or lubricant to each trolley wheel on each side of conveyor system into which it is installed, simply by flicking a switch. When every wheel is serviced, system may be switched off and is in constant readiness to go into operation again. *Stewart-Warner Corp.*

36

Ball bearings—so round, so smooth



Micro flanged instrument bearing is an extra-light ball bearing featuring straight rather than tapered OD, refined processing to super-precision (ABEC class 5 and higher) tolerances, and a two-piece, cone-controlled cylindrical pocket, pressed metal cage. Balanced design is said to favor low and uniform running torque as well as quiet operation. *New Hampshire Ball Bearings, Inc.*

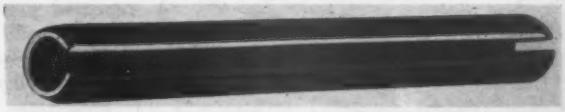
37

For all Top Bananas

This new banana truck provides quick, safe handling of two bunches at a time from car to storage, storage to cutting room or delivery truck. Bananas, suspended from hooks on top frame, are protectingly cradled in heavy double canvas between frame side members. Auxiliary frame and top of main frame provide firm grip for operator. Truck is of all tubular steel, electrically welded construction. *Nutting Truck & Caster Co.*

38

Spring-pin fastener is self-locking



Sel-lok spring pins replace tapered, grooved and dowel pins in all kinds of assemblies. They are said to be vibration proof, shock absorbent, easy to install and remove, and to eliminate expensive reaming operations. Pins are available in carbon and corrosion-resistant steel, and, as specials, in copper-based and aluminum-based alloys. *Standard Pressed Steel Co.*

39

Dual voltage charger does work rapidly

Baldor "80" fast charger charges a six-volt battery at a rate of 80 amp. or less and charges a 12-volt battery at a rate of about 40 amp. Additional features include first grade ammeter, light weight—30 lbs. *Baldor Electric Co.*

40

Powerful magnets remove tramp iron

A more powerful, re-designed line of low-cost, non-electric, permanent plate magnets for removing tramp iron from material carried in chutes, ducts, or on belts is now available in a complete range of sizes. Models 1-H and 2-H Perma-Plate magnets are constructed of larger Alnico blocks increasing their magnetic strength by as much as 50 per cent. *Dings Magnetic Separator Co.*

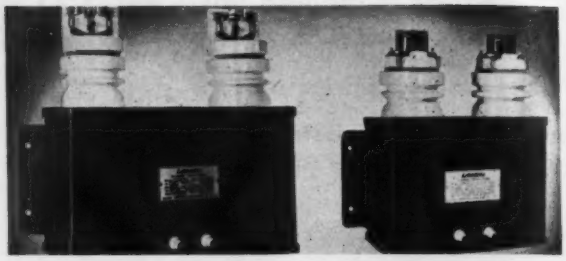
41

Make tracks with this new tractor

Model TC-60 Payloader tractor has a drawbar pull of 6,000 lbs. Less than 5 ft. high and 10 ft. long, machine's outside turning radius is 10 ft., 1 in. Tractor has torque-converter drive coupled to a full-reversing two-range transmission so it has a forward speed range from 1.6 to 16.9 mph. and a reverse speed range from 1.8 to 19.0 mph. *The Frank G. Hough Co.*

42

Filament transformers handy for electronic applications



Two new filament transformers each supply filament power for two rectifier tubes normally operated under conditions of high voltage to ground or between tubes. This combination of dual duty within a unit enclosure saves space, improves appearance and simplifies mounting, wiring and handling. Each unit is compound filled and specially designed and insulated to withstand maximum DC operating voltage of 12 kv. and 17.5 kv. respectively. *Lindberg Engineering Co.*

43

Two new electronic packages

Two packages built around basic components of all-electronic Swartwout Autronic control system are now available. Recording package is composed of Type P2T pressure primary element transmitter, Type A2R recorder and a constant voltage transformer. Controlling and recording packager includes these items plus a Type A3C controller with proportional band and automatic reset, M2C manual control, and P2R power relay. *The Swartwout Co.*

PEAK PRODUCTION
Demands Dependable
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BARRY CONVEYOR PULLEYS

Welded steel construction. Light in weight yet extremely strong. They're easy to install. Available in a wide range of sizes for all general conveyor services.

DICK ROPE V-BELT DRIVES

V-Belt and sheaves operate with engineered efficiency. Give maximum service with minimum stretch . . . Resilience maintained. Sheaves carefully balanced and accurately machined to minimize belt wear.

POWER TRANSMISSION AND CONVEYING EQUIPMENT

Industry has recognized through years of experience that Dick power transmission and conveying equipment has a reputation for greater efficiency . . . longer life . . . and rugged ability to absorb repeated peak operating demands. Call or write the R & J Dick Co. office nearest you for help in increasing the efficiency of your production.

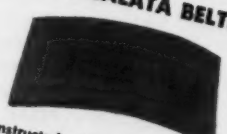
FACTORY SALES REPRESENTATIVES FOR

ATLAS ROLLER CHAIN, SEWALL ROLLER CHAIN SPROCKETS, GILMER V BELTS AND HIGH SPEED ENDLESS BELTS.

BARRY STEEL SPLIT PULLEYS

Scientifically designed — electrically welded construction. Light in weight. Easy to install. Maintain exact shape under all loads.

DICK'S BALATA BELTING



Constructed of hard surface, closely woven duck. Thoroughly impregnated with Balata Gum. Free from stretch and shrinkage — and moisture resistant. High in power transmission efficiency. All "Dick-belts" guaranteed.

MF 551

R. & J. Dick COMPANY, INC.

SAN FRANCISCO 7, CALIF. 510 BRYANT ST. SUTTER 1-1341
SEATTLE 4, WASH. 307 MARITIME BUILDING MUTUAL 1922

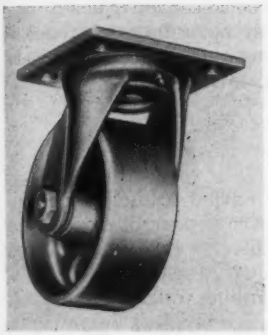
44

From truck to storage with special roller platform

A specially designed and built hydraulically operated roller platform is intended to handle unwieldy boxes of stainless steel or aluminum sheet from truck to storage. This 4-way roller platform allows one man to complete the entire operation. One set of roller centers loads on the platform positioning it for easy racking, while the other set is used for putting loads into storage racks. *Lewis-Shepard.*

45

Inexpensive casters with hi-price features



PressWeld caster, a line of light-weight casters in low-price field, boast of hardened raceways and unbreakable fork and top plate. Particularly suited for dollies, racks, box trucks and similar moderate-duty usage, they have a wide range of industrial applications. They are available in 3¼-in. through 8-in. wheel sizes with wheels of ni-steel, rubber or molded plastic. *Service Caster & Truck Corp.*

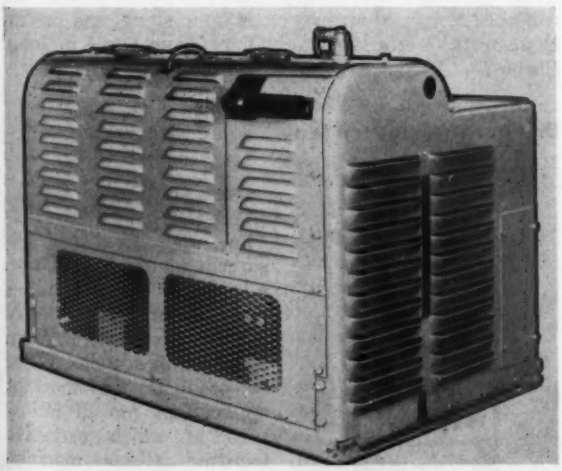
46

Rayon fabric rubber transmission belt both strong and flexible

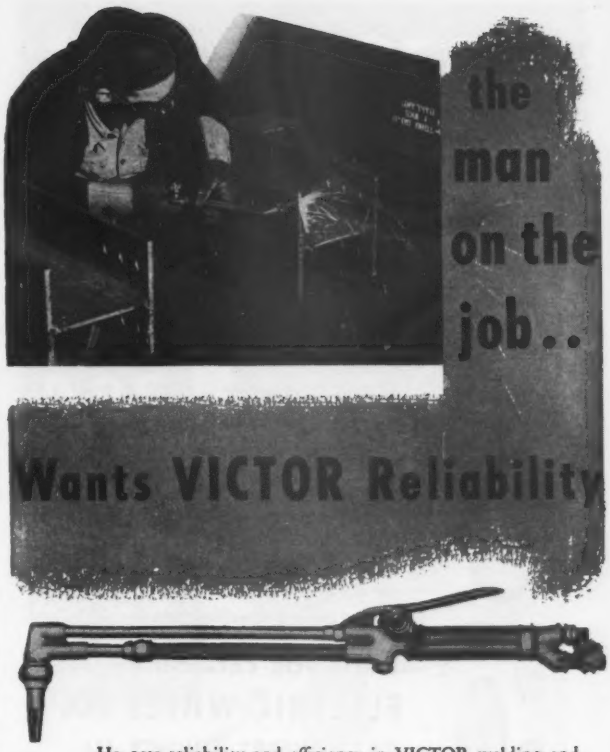
A new rubber transmission belt, Drivesall, first ever made with all rayon fabric, is said to be 25 per cent stronger and has up to ten times greater flex life than cotton fabric belts made with same number of plies. Tests on drive show new belt to have 50 per cent less stretch than cotton fabric belts. Product is designed for use on medium duty drives for fans, blowers, air compressors, pumps, etc. *B. F. Goodrich Co.*

47

Diesel-electric units for electric industrial trucks



Model N is a diesel-electric continuous duty power unit for use with fork trucks of 4,000-lbs. to 6,000-lbs. capacity and platform trucks up to 10,000-lbs. capacity. Chief advantages claimed for Ready-Power units include: simplified preventive maintenance; quick power availability; easy-operating electric controls; durability; and economy. *Ready-Power Co.*



He gets reliability and efficiency in VICTOR welding and cutting torches, and regulators because they're built right.

Precision machining assures leak-proof joints and ease of maintenance. Four head angles—90°, 75°, 45° or straight—and 4 lever positions—top or bottom and forward or rear of handle—enable you to choose the torch that exactly fits the job in hand.

VICTOR's complete range of tips, in sizes 000 through 16, are designed to give maximum cutting speed and gas savings on any job from light sheet to heavy plate cutting.

See for yourself why it costs less to own and operate VICTOR. Ask your VICTOR dealer for an on-the-job demonstration *TODAY.*

VICTOR CIRCLE CUTTING ATTACHMENT

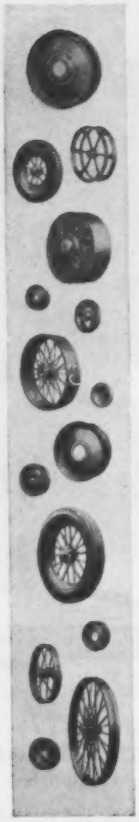
adjusts to various heights and diameters from 1¼" to 28".

VICTOR

Welding and Cutting Equipment Since 1910

VICTOR EQUIPMENT COMPANY

3821 Santa Fe Ave. LOS ANGELES 58 | 844 Folsom Street SAN FRANCISCO 7 | 1312 W. Lake St. CHICAGO 7



FOR FARM AND INDUSTRY

ELECTRIC

WHEELS ARE RIGHT

Over 65 years in wheel manufacturing have given us the "know how"—modern production methods assure long life and efficient wheel performance in the field.

There is an ELECTRIC spoke or disc wheel for most types of portable equipment. Axles are available where required.

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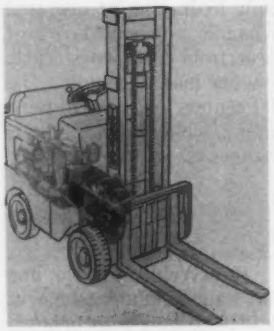
48

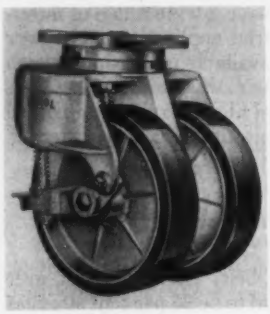
Torque drive heads for success



A new torque drive for Towmotor fork lift trucks incorporates outstanding advances found in finest automotive torque converter drives. It also combines ruggedness and stability essential to steadily dependable fork lift operation under every extreme of service. TowmoTorque employs a heavy-duty, air- and oil-cooled converter in a capacity range to match requirements of firm's varied power plants. *Towmotor Corp.*

49

Shock absorbing caster for s-m-o-o-t-h movement



Smooth load-glide over uneven surfaces is achieved in this new heavy duty 12-in. dual suspension shock-absorbing caster and wheel assembly. It is light weight, made of #356 heat treated prime aluminum alloy. Lubricated for life and permanently sealed, its load range goes to 2,000 lbs. *Aerol Co., Inc.*

50

Arc-torch cuts and melts stone at 8,000 deg.

A new process for cutting and piercing stone, cement, concrete and refractory materials, "DynArc," employs an arc rod, for first time upon non-conductive material and without a ground connection. Device creates its own arc, requires no ground and does not have to be struck upon metal—operator has complete control at all times. Arc will operate in mid-air as well as upon stone, and has all characteristics of a super torch flame from 5 to 8 in. long. ChemoTec division of *Eutectic Welding Alloys Corp.*

51

Dry out the modern way

Newest thing in way of refrigeration driers is T-Flow, using a moisture absorbent material, An-Drite, a disiccant that achieves new standards of efficiency in eliminating moisture from refrigerating systems. These two products have important applications for all industries in which excessive moisture affects machine performance including electric transformers for telephone lines, gasoline carburetors, natural and manufactured gas lines. *Ansul Chemical Co.*

52

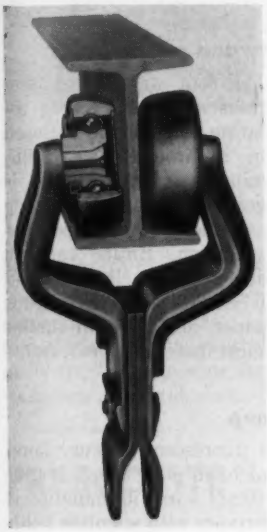
Stripping paint the solvent way

Two new paint strippers, composition numbers 56 and 57, are designed respectively for tank immersion stripping and brush-on stripping of a wide variety of alkaline-resistant paints and lacquers. A special service report will be sent to those requesting particulars regarding these products. Circle above number on post card and send in for free information. *Oakite Products, Inc.*

Use rip-out postcard for more information

53

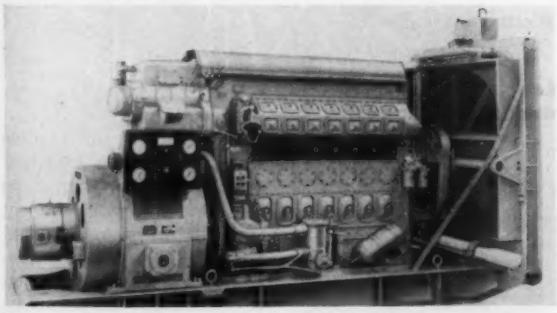
A trolley conveyor with character



A newly-developed 4-in. trolley conveyor, #4207 Loadstar, is termed ideal for all general trolley work where precision, high quality equipment is required. Wheel is made with steel or felt seals having hardened inner and outer races. Balls are of chrome steel and are retained in a pressed steel cage. Outer ball races are ground. Tire surfaces are hardened by a special process. *Mathews Conveyer Co.*

54

Bantam-weight diesel for hefty jobs



An opposed-piston diesel, newly designed for heavy-duty applications, is said to do the job although it is a fraction of size and weight of conventional heavy-duty engines. It is expected that this unit will fill needs in stationary power plants, marine and railroad markets for engines in 225 to 750-hp. range. *Fairbanks, Morse & Co.*

55

A paint that stands up to bad weather

A new anti-rust paint promises elimination of bad weather as a contractual hazard. Created to combat ferric corrosion, paint can be applied by brush or spray to wet or slightly rusty surfaces under weather conditions such as early morning dew, atmospheric rust, fog, light rain or frost. It is offered as a replacement for red lead or zinc chromate primers. *Wachtel Laboratories, Inc.*

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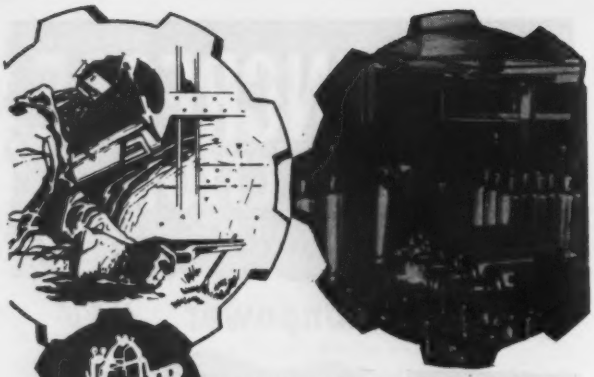

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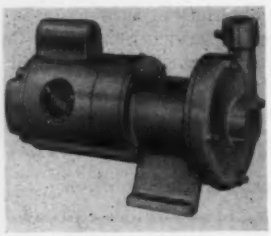
56

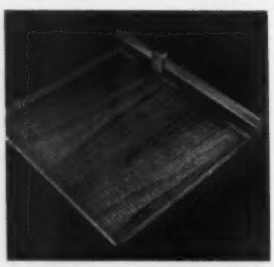
Low-priced pump for air-conditioning



This new centrifugal pump, especially designed for air-conditioning industry, is already winning engineers' and contractors' approval on industrial installations. While modestly priced, it uses a standard-make motor, a precision ground shaft for smooth operation, a bronze fully enclosed impeller and single stage and suction units. *Universal Manufacturing Co.*

57

Trim-board combines safety and accuracy



Rolcut trim-board features a self-sharpening rotating wheel-blade enclosed in a protective cast-aluminum carriage. Blade is geared in a ratio to provide extreme ease and speed of operation. Entire carriage assembly travels on a solid I-beam track and trims paper, acetates and similar sheet materials. *Zeus, Inc.*

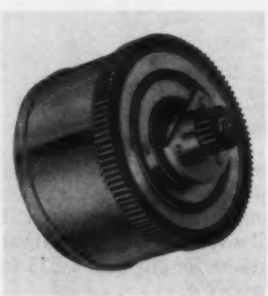
58

Light up with a mercury lamp

A newly developed 700-watt fluorescent-mercury lamp is expected to find its popular niche in places such as congested shopping areas where brilliant street illumination is a boon to selling and shares importance with scientific lighting to reduce traffic danger. It is said to give 2½ times more white light without increasing power costs and to outlive an incandescent lamp of similar size by 300 per cent. *Westinghouse Electric Corp.*

59

Lear's magnetic clutch now available to industry



This firm's outstanding magnetic powder clutch is now ready for commercial and industrial equipment manufacturers' applications. It has been application-tested for use on dynamotors, generators, marine drives, reversing drives, servomotors and variable speed drives. While three sizes are presently standard (1, 2, and 2½ in.), company is prepared to design and produce magnetic clutches for other applications. *Lear, Inc.*

60

"Foundromatic" core dryers easily installed

There are two additions to "Foundromatic" core dryer line—15- and 25-kw. units housed in identical components. Generator section of these units, previously a separate component, is integrated with oven portions to facilitate as-

sembly and improve installation. Space saving, easy accessibility to all electrical components, plus minimum maintenance requirements, are other characteristics of new models. *Allis-Chalmers Manufacturing Co.*

61

Speed production with optical flats

Said to be largest monochromatic light generator on market, "Monolight" features a 20-in. diameter, high intensity light source. Instrument was developed to meet industrial demands for greater capacity so that large parts or large numbers of smaller parts can be checked more easily and rapidly for surface flatness, finish, dimension, etc. Monolight is also intended to facilitate use of large optical flats, up to 10 in. in diameter, now marketed by same firm. *The DoAll Co.*

62

Fiberglas duct liner reduces sounds

A new Fiberglas insulating product for line interior of air conditioning or warm air ducts has a high noise reduction efficiency, thus effectively reducing sounds that normally travel through air ducts. Its flexibility allows for installation on metal sheets before they are bent to form ducts. Thermal insulating properties permit metal surface of ducts to act as a vapor barrier. *Owens-Corning Fiberglas Corp.*

Use rip-out postcard for more information

63

"Five ft., six in. of the handiest chain ever built"

This versatile Handy Chain is assembled with regular 2/0 liberty coil straight link chain with a 1⅜-in. diameter welded ring at one end and a 3⅝-in. swivel snap at the other end. It can be used as a chain for trailer safety, boat mooring, bundling, barrier, and for dozens of other purposes. *Round Chain Cos.*

64

X-ray gauge controls rolling mill equipment

Quality control, an increasingly important factor as standards of finish and accuracy of gauge become more critical, is neatly solved with this modern method of electronic gauging and control. It will also aid rolling mill operators faced with problem of setup time required for wide variety of copper alloys now processed, as it provides a precise, automatic control of screw-down adjustments. *Chase Brass & Copper Co.*

PRESCOLITE MANUFACTURING CORP. — Berkeley, Calif.

Top photo shows entering end exit end of ROSS "U" shaped Paint Baking Oven with turnaround at far end.

Lower photo shows 3-stage Cryo-Coat Washer with solution heating equipment visible.

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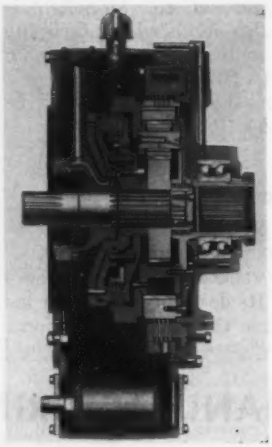
65

Head-gear for arc welders

Comfort-Shield is a new arc welding head shield designed specifically for operator comfort. Main feature is a permanently pliable head band made of plastic rather than the usual fibre. Adjustable band fits head in same way that a hat does, giving a firm, comfortable fit all day long. It can be put on with one hand. *The Lincoln Electric Co.*

66

Pep up your torque converters



Do you want to obtain extended full-range performance from your hydraulic torque converters? Then try Model T-302, a new oil-actuated 2-speed transmission developed just for this purpose. It fills the bill by providing a dual range of converter operation. Unit is equipped with a direct drive and single stage planetary gear system. Two ratio spreads are available: direct drive and 2.69:1 reduction, or direct drive and 3.07:1 reduction ratio. *Twin Disc Clutch Co.*

67

Separators stop tramp iron fires

Removal of nails, bolts, washers and other harmful ferrous metals from a production line can result in a threefold saving: in machinery maintenance, downtime, and fire elimination. How is it done? Eriez's non-electric magnetic separators will remove up to 20 or 30 pieces of tramp iron daily, hold them fast and keep them from going where they shouldn't. *Eriez Manufacturing Co.*

68

Next time, try your vapor without grease

Vapor degreasing is now possible in low cost equipment with this Baronet barrel degreaser. Cleaning is accomplished with non-inflammable trichlorethylene vapors, an especially effective method for removal of oil and grease. Device may be installed anywhere — just plug it in and start cleaning. *Baron Industries of Calif.*

69

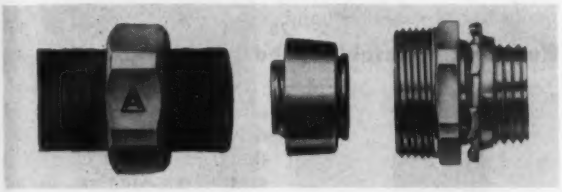
Clean up with this miniature-sized floor machine

An economical floor maintenance machine is newly designed and priced especially for small shops, offices, restaurants, clubs or showrooms. "Johnson's Wax Special 12" has

many features of larger heavy-duty floor machines. It can be used for waxing, scrubbing, shampooing rugs, sanding or buffing. Being only 11 in. high, it is convenient to use under fixed furniture and confined quarters. *S. C. Johnson & Son, Inc.*

70

How are your liquid connections?



New liquid-tight connectors, UL-approved for protection of electrical conductors on machinery where liquid-tight flexible conduit is used, are recommended where a liquid-tight flexible raceway is required. Unique design of connectors provides for an all-metal flaring ferrule which, under compressing action of tightening nut, is joined securely with flexible conduit into a liquid-tight connection. *Appleton Electric Co.*

71

Maintenance men can grow 19 ft. tall for overhead work

New Lift-A-Loft is developed to eliminate overhead maintenance problems, cut costs, and reduce to one man the number often required to make such jobs safe. Step ladders and scaffoldings are eliminated. Worker rides battery-powered elevator to destination, pushes a button, and is up in air ready to work. *Barrett-Cravens Co.*

72

Higher fork elevation with this sit-down fork truck

New model of No. 430 Yak fork truck is a 4,000-lb. capacity sit-down truck featuring many improvements in performance and construction. Maximum fork elevation is increased to 130 in. Free lift is now 58 in. Travel speed is up to 6.5 mph. Truck is now able to right-angle stack 36-in. long loads in 10½-ft. aisles. For economy of operation, chassis weight is reduced to 7,925 lb. without sacrificing stability. *Mercury Manufacturing Co.*

73

Lightweight conveyor is stronger-than-steel

Designed for strength and easy handling, this aluminum gravity wheel portable conveyor is said to be 33⅓ per cent lighter than steel models. Every part, except wheels and axles, is made of a resilient aluminum alloy that is stronger than steel. Conveyor has a 2½ by 1-in. channel and rigid bolt construction. *Speedways Conveyors, Inc.*

Maas

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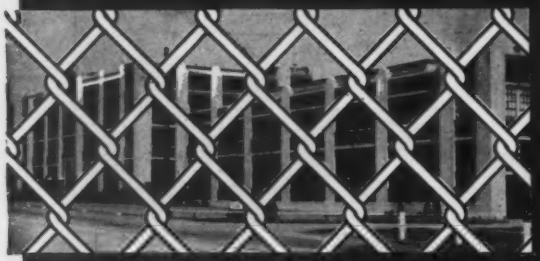

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FIG. 1402
Heavy duty bar handle platform truck

FIG. 1211-K
"Auto-Load" Barrel Truck

FIG. 1112 HPL
Light weight 2-wheel utility truck

FIG. 1011
Balance-type platform stake truck

FIG. 10
Western Pattern with Steam Bent Handles

FIG. 216
Golden Gate Pattern

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74

Kitchen stuff for conveyors

A rigid apron, available on order for all Metzgar belt and live roller conveyors, can be used as a bench in assembly or inspection operations. Variable speed drive can be furnished to suit in ranges of 4:1 and speeds from 5 fpm. up. Belts to meet special handling needs may be ordered for any power belt model. *Metzgar Co.*

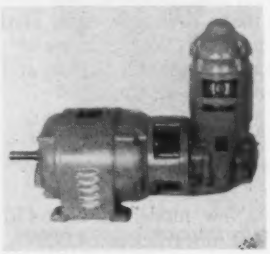
75

Electronic adjustable-speed drive for economy

V*S, Jr. is an improved, all-electric adjustable-speed drive of from ¾ to 3 hp. designed to take care of a steadily growing number of production jobs and processing operations having these relatively low horsepower requirements. Available in five sizes, device gives industry broader opportunities to increase output, trim costs and improve product quality. *Reliance Electric & Engineering Co.*

76

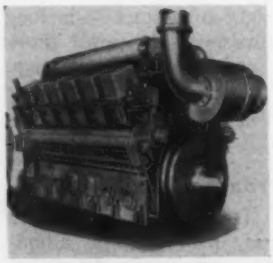
Multimotor packaged unit delivers 1,750 and 100 rpm.



A packaged unit, consisting of a horizontal motor, footless right angle worm gear motor and an overrunning clutch is a recent development primarily designed for powering equipment such as dry-cleaning machinery. Unit has take-off speeds of 1,750 and 100 rpm. Quiet in operation, unit avoids many misalignment problems by having a single mounting base. *U. S. Electrical Motors, Inc.*

77

Prime movers operate efficiently in stationary and marine conditions



Four-cycle Supairthermal V-type engines are designed to meet demand for heavy duty prime movers of moderate weight and small physical dimensions. They are built in 12 or 16 cylinders of 13-in. bore and 16½-in. stroke covering a range from 2,400 to 4,260 hp. at 450 to 600 rpm. They are built for liquid fuel, duafuel or spark-fired gas operation. *Nordberg Manufacturing Co.*

78

Personalized load binders don't get lost

Identification in raised letters on load binder handles puts an abrupt end to their straying habits. Test cases show large and small users reporting 50 to 100 per cent savings by cutting off theft and loss in this manner. Up to 40 letters can be used for name, city and state. *Canton Manufacturing Co.*

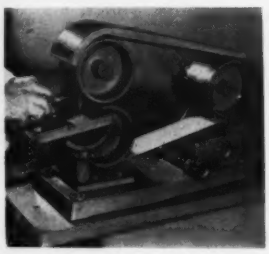
79

For improved floor maintenance plus easy storage

Junior Whirlwind 12 is especially designed for polishing, scrubbing and steel wooling floors. Special features include: toe latch handle release that eliminates stooping when adjusting handle to operating position; stowaway handle that locks upright for easy storage in limited space; and fixed wheels—no springs to pop up unexpectedly and drop machine. *Holt Manufacturing Co.*

80

Carbide cutting tools to have sharp edges this year



Based on use of low-cost abrasive paper belts and a new type belt machine, this method for final finishing will make possible greatly expanded use of carbide cutting tools throughout metalworking, woodworking, and plastic industries. Method should supplement, and in many cases, replace conventional diamond wheel method—especially where initial cost of diamond wheels is prohibitive. *Minnesota Mining and Manufacturing Co.*

81

No quibbling on this clutch equilibrator

A new clutch equilibrator is reported to be so good that manufacturer now uses it as standard equipment on his line of punch presses and shears. A two-part unit consisting of a heart-shaped cam and an air chamber with automatic pumping and regulating mechanism, acts as a frictionless brake and removes all load from clutch assembly at time of disengagement. *Diamond Machine Tool Co.*

82

Bar, pipe and rod unit easy to load

Steel Lyon bar, pipe and rod units are said to successfully solve unusual storage problems. They are easy to load and unload, and they store lengthy material in a minimum of space. They are available in double and single face models and finished in green baked-on enamel. *Lyon Metal Products, Inc.*

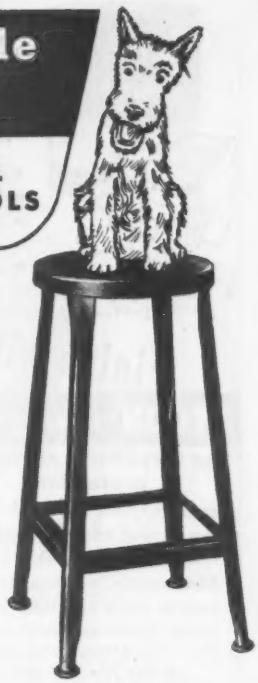
83

Canned electrodes

Murex line of stainless steel arc welding electrodes is now being packed in hermetically sealed metal cans. Smaller diameters come in five-lb. containers and larger diameters

Comfortable Alertness!

—With UHL STEEL STOOLS



Seated on UHL Steel Stools all workers are more efficient in performing their allotted tasks. This quality all-purpose stool. is of specially processed cold rolled steel, which allows maximum strength with minimum weight. Comes in 4 models (each in many sizes—with welded backs at small extra cost). Years of service—no maintenance cost.

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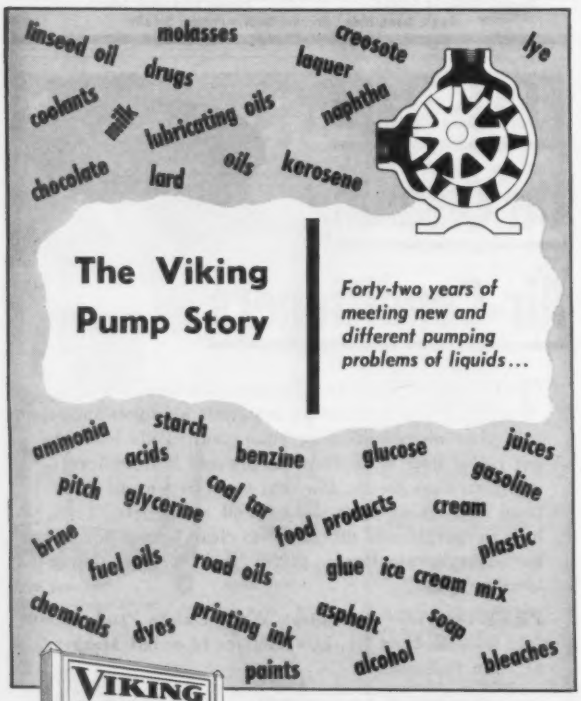

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in 10-lb. containers. This method prevents moisture pick-up by electrode coatings and, it is claimed, assures consistent peak performance. Storage problems are simplified and shipping damage is held to a minimum. *Metal & Thermit Corp.*

84

Quiet motor power for your own well being

In order to reduce transmission of noises and vibration to motor support, Wagner motors are provided with resilient base mountings. Firm furnishes resilient mounted standard motors with bases constructed to support annular resilient rings mounted on motor endplates for use on single-phase and three-phase power, and in fractional and integral hp. motor ratings built in NEMA frame sizes 225 and smaller. *Wagner Electric Corp.*

85

Pinion cutting machine built for accuracy

High production combined with extreme accuracy (precision gears and pinions of .0002-in. total composite error can be cut) make "Safag" gear and pinion cutter a machine particularly suited for instrument, meter and similar industries. Other applications for this full automatic cutter include gear segments, ratchets, taps, reamers, splines, escape wheels, etc. *Carl Hirschmann Co.*

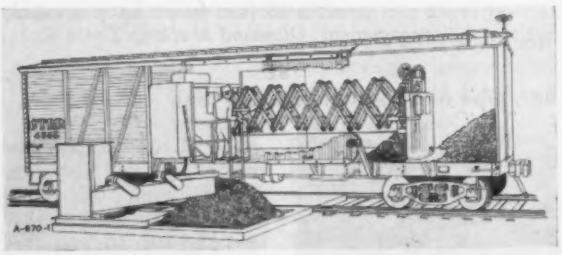
86

Prefabricated circuits mean savings

Prefabricated circuits promise savings in production of low power electronic devices. Practical mainly because of its simplicity and uniformity, a printed circuit is a metal reproduction of a conductor pattern which has been bonded to an insulated material. Serving as a conducting medium in electronic assemblies, such circuits replace, to a large extent, internal maze of wires normally found in conventionally assembled equipment. *Synthane Corp.*

87

Swiveled loads load swifter



This centrifugal thrower unit is designed to load box cars over tops of three 20-in. grain doors. Loader unit is mounted on a sloping feed chute which pivots into car. Operator can load and trim car without entering it, since thrower pivots on end of feed chute to reach car's every corner. Throw direction is controlled by a chain operated wheel from loading dock. *Stephens-Adamson Mfg. Co.*

88

20 per cent more capacity claimed for batteries

A claim of 20 per cent more capacity in same amount of space is made for new line of T-H Exide Ironclad batteries. Product incorporates new materials and structural changes

to give increased capacity which is frequently required in materials handling and haulage jobs to work through a full shift. Corrosion-resistant Silvium, incorporated in grids, contributes to longer battery life and is an added feature. *The Electric Storage Battery Co.*

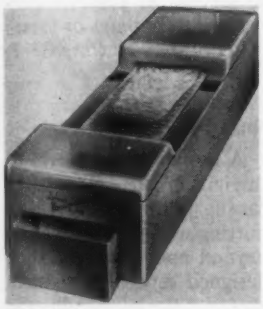
89

Here's spring for your trailers

A new air spring now in production is engineered to keep floor of tandem-axle trailers parallel to axles regardless of shifting loads, misloading, or high-crown roads. Action is possible by individual air control in each unit spring. Trucking owners and operators will be able to increase their payloads appreciably because of springs' light weight. *The General Tire & Rubber Co.*

90

Fast filtration for water-soluble coolants



Automatic, continuous filtration of water soluble coolants for individual grinders, hones, and other machine tools is provided by Vacumatic filter, a constant vacuum, endless belt device. Employing vacuum rather than gravity, it is said to operate four times faster than previous endless belt filters. Keeping coolant cool and delivering de-watered sludge for easy disposal are right up its alley. *U. S. Hoffman Machinery Corp.*

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91

A pump line is improved

For supplying, circulating and boosting of water and clear liquids at medium and high heads, with special emphasis on product quality and long life rather than low initial price, a complete line of 2, 3, 4 and 5-stage split-case pumps is recently modernized and consolidated. Type TU line pumps are offered in 2-stage designs with capacities up to 3,000 gpm. and heads up to 800 ft., and for liquid temperatures up to 300 deg. F. *Peerless Pump Division, Food Machinery and Chemical Corp.*

92

Tote your own electric power plant

This light-weight gasoline driven generator will provide an independent source of electricity beyond limits of power lines. Available in two models, it will, among other uses, serve as a power supply for its manufacturer's 30 different portable electric tools. Model 119 is a 1,500-watt direct current unit supplying 115 volts at 13 amps. Model 118 provides alternating current and weighs 135 lbs. less than first mentioned model. *Porter-Cable Machine Co.*

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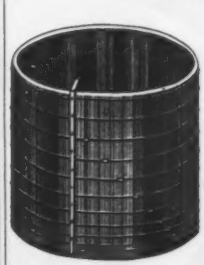

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93

Rubber hose built to withstand high temperatures

An improved rubber hose for gas welding apparatus, said to withstand greater heat and flame than any previous hose, is also noteworthy for its light weight and ability to resist grit, sharp metal and oil to which welding hose is frequently exposed. Improved hose has a neoprene synthetic rubber cover for flame resistance and a rayon reinforced carcass which offers great strength and long life. *Hewitt-Robins, Inc.*

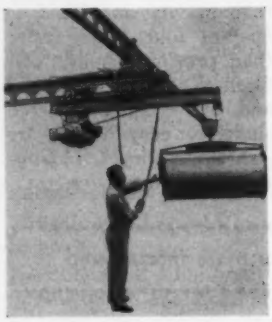
94

Out with rust

Exitrust is applicable over damp or dry surfaces and possesses maximum penetrating and wetting qualities. Correct solvent balance and pigment volume ratio, plus use of resins and inert pigments known for their chemical resistance as well as water-proofing properties, makes product an excellent rust inhibitive also serving as effective protection against chemical attack caused by spillage or fumes where acids, alkalis or salts are used. *Casey & Case Coating Co.*

95

Materials-handling goes around pillars



A new thing in overhead carriers is this one with a cantilever arrangement permitting unit to handle loads beyond end of crane. It is designed especially to take care of materials handling in areas between roof-supporting pillars that cannot normally be covered by cranes, and for reaching through doorways. Extension allows hoist to reach out as much as 2 ft., 1½ in. beyond end of crane. *The Cleveland Crane & Engineering Co.*

96

Two new fork lift trucks on market

Two completely new fork lift trucks, Models YC-40 and UC-30 with 3,000 and 4,000-lb. capacities, are powered by heavy-duty, water-cooled industrial engines and mounted on cushion-type tires. Outstanding features are said to be compactness, durability and maneuverability. Trucks are "functionally" designed for appearance as well as efficiency. *Hyster Co.*

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WESTERNERS AT WORK

California

Kaiser Aluminum & Chemical Corp., Oakland, makes following appointments: ARTHUR H. BRANSTAD, manager of fabricating plant operations with headquarters in Oakland; DAVID MAYERS to succeed Branstad as works manager at firm's Trentwood, Wash., rolling mill; JAMES C. HICKS, director of refractory research to succeed LESLIE W. AUSTIN, deceased.

Hufford Machine Works, Inc., El Segundo, reports personnel changes as follows: HARRY P. SMITH, JR., executive vice president and general manager of operations; WALTER G. WHEELER, vice president in charge of engineering and production; KINGSLEY DRONE, chief engineer; N. T. HARTY, secretary-treasurer; A. R. COLLES, controller and assistant secretary-treasurer; WILLIAM KAHLER, plant superintendent; CLIFFORD HORTON, chief of production, planning, and scheduling.

MORROUGH P. O'BRIEN, dean of College of Engineering at University of California, Berkeley, accepts position of consulting engineer to *General Electric Co.'s* aircraft gas turbine division while on leave from university post.

Kaiser Steel Corp., Oakland, promotes EWALD CARLSON, formerly general foreman of electric weld pipe mill at Fontana, to assistant superintendent of mill. CARL W. LUDWIG rises from general foreman of soaking pits and blooming mill to position of assistant superintendent of operation.

HERSCHEL L. DRIVER, previously *Standard Oil Co. of Calif.'s* staff stratigrapher, covering Pacific Coast from Los Angeles, is named senior staff geologist with company's exploration department. His headquarters will be in San Francisco.

JOE R. HORTON is appointed general foreman of *Marquardt Aircraft Co.*, Van Nuys.

L. EUGENE ROOT, nationally known aeronautical scientist, is named by *Lockheed Aircraft Corp.*, Burbank, as its director of development planning.

HUGH F. COLVIN, formerly vice president and treasurer of *Consolidated Engineering Corp.*, is elevated to position of corporation's vice president and general manager. VICTOR POLLOCK, controller, is chosen treasurer.

CARL S. WALKER is named general manager of *Eureka Redwood Lumber Co.*, Eureka, subsidiary of *M and M Wood Working Co.*, Portland, Ore. He comes from *Feather River Pine Mills*, Feather Falls, where he was general manager.

C. S. Walker

R. F. Asmussen

ROLLO F. ASMUSSEN is appointed general manager of aircraft hardware division, *Clary Multiplier Corp.* He was recently works manager of division's Los Angeles plant.

FRANK A. DUNNIGAN, formerly head of terminal equipment section, *Hoffman Laboratories, Inc.*, Los Angeles, is moved up to chief product design engineer for TV manufacturing division of *Hoffman Radio Corp.*, Los Angeles. RAYMOND W. MEYER is appointed quality control director of same division. He replaces B. DORRIS who becomes Western sales manager for Hoffman.

EDWARD S. ALLEN joins staff of *Industrial Systems, Inc.*, Los Angeles, as chief design engineer.

JAMES HAIG is appointed personnel manager of *Soulé Steel Co.'s* San Francisco plant and office. He comes from *American Can Co.*, where he was personnel manager of its plant in San Jose.

EDWARD J. HORKEY joins *Pastushin Aviation Corp.*, Los Angeles, as vice president in charge of engineering. He previously was with *North American Aviation, Inc.*, as chief technical engineer.

American Brake Shoe Co. appoints EDWARD DONEGAN as superintendent of Brake Shoe and Castings division plant in Pomona.

Calaveras Cement Co. adds three new vise presidents to its list of officers: E. M. BARKER, manager of firm's plant at San Andreas; M. J. LONDON, general sales manager; and ARNOLD M. ROSS, assistant vice president. GRANT METZGER, mechanical superin-

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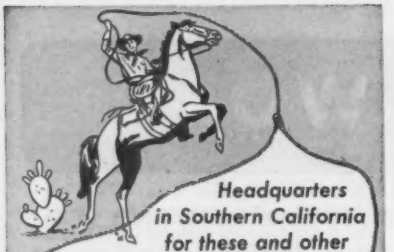

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tendent, is named acting manager of San Andreas plant.

Colorado

With retirement of HENRY W. DAHLBERG, director of research for *Great Western Sugar Co.*, Denver, following executive research personnel promotions are made: E. H. HUNGERFORD, general chemist, is named director of research and chemical control; PHILLIP B. SMITH's work expands to include seed-breeding activities and responsibility for firm's experiment station at Longmont; WHITNEY NEWTON comes from Loveland to Denver as assistant director of research; and J. T. DAVIS, formerly chief chemist at Billings, Mont., comes to Denver as assistant general chemist.

DR. JOHN M. LENOIR, nationally known chemical research scientist and educator, becomes chairman of chemical engineering department at University of Denver.

O. R. HAUETER, formerly vice president of operations, *Continental Air Lines*, is appointed vice president of maintenance, engineering and operations at CAL's Denver office.

Denver & Rio Grande Western Railroad names RAGON C. CAVNESS as its assistant engineer in industrial development department. He previously was with Atomic Energy Commission and Bureau of Reclamation in an engineering capacity.

D. E. BUCHANAN, president of *Heckethorn Manufacturing and Supply Co.*, Littleton, receives Hanlon Award, one of petroleum industry's ranking awards.

W. Brill

F. F. Argust

FRANK F. ARGUST is appointed superintendent of industrial engineering of *Colorado Fuel and Iron Corp.*, Pueblo. He rises from position of senior industrial engineer. He names DEAN B. VALENTINE, formerly senior industrial engineer, as his assistant. WILLIAM BRILL is promoted from position of chief engineer, Pueblo, to that of director of engineering. W. R. DUNN, formerly assistant chief controller of this corporation, is appointed divisional controller of Western division, CF&I.

Idaho

LEWIS M. ROBINSON, formerly mine superintendent of *Triumph Mining Co.'s* Triumph mine, is named general manager there. He replaces A. H. SHOEMAKER, resigned to join *Homestake Mining Co.* as general manager of its operation at Lead, South Dakota.

JOSIAH WORK of *Westvaco Chemical division, Food Machinery and Chemical Corp.*, takes over management of his firm's Pocatello elemental phosphate plant.

New Mexico

MERTON I. SIGNER advances to position of plant geologist, Potash division of *International Minerals and Chemical Corp.* in N. M. He replaces CHARLES W. HICKS, resigned. E. C. SKINNER is now industrial engineer of same division. HOWARD J. HUSING, formerly a driller in mine department, becomes a junior engineer in mine engineering department.

Oregon

R. H. PLOW resigns from staff of *Oregon Forest Products Laboratory* to join *A. O. Reynolds Co.* of Painesville, Ohio.

JOSEPH I. STEEL is named president of *Moore Dry Kiln Co.* of Oregon. He succeeds FORREST COBB, deceased.

W. B. CALVERT, plant manager, is elected vice president in charge of manufacturing, and R. T. MONTAG is elected first vice president of *Portland Woolen Mills, Inc.*

THOMAS D. TAYLOR is elected president of *Freightliner Corp.*, Portland.

West Coast Lumbermens' Association appoints C. D. TATEM as its chief accountant, Portland headquarters. He comes from *Edward Hines Lumber Co.*, Hines, Ore. J. F. RAWSON, formerly a project engineer for AEC, Richland, Wash., is named Association's field representative working out of Portland office in Oregon and California.

Utah

WILLIAM B. HALL is named vice president of *Vitro Chemical Co.*, Salt Lake City. He retains his position as manager of uranium mill at Salt Lake.

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FREDERICK C. GREEN, formerly assistant general manager of Chino Mines division, *Kennecott Copper Corp.*, is promoted to assistant general manager, Utah Copper division. ALBERT KASTELIC is named general foreman at Bingham mine.

Columbia-Geneva steel division, United States Steel Corp., appoints E. V. BOORMAN as coke and by-products division superintendent, Geneva works. He is promoted from position of general foreman of Geneva coke plant. W. L. SNOW, formerly assistant to division superintendent, Geneva works rolling mills, becomes superintendent of structural and sheet mills.

D. J. POPE, formerly general manager of *American Smelting and Refining Co.*, Salt Lake City, is named assistant to vice president in charge of mining. His headquarters will be in New York City. He is replaced as general manager by F. V. RICHARD, who moves up from position of manager of operations.

J. T. HIGGINS, now manager of operations at *Standard Oil Co. of Calif.'s* Richmond, Calif., refinery, will replace C. E. FINNEY, JR., retired, as president of two Standard subsidiaries, *Salt Lake Refining Co.*, and *Salt Lake Pipe Line Co.*

Washington

WILLIAM L. BELL, Spokane mining engineer, is elected president of *Butte Highlands Mining Co.* He succeeds W. S. NORMAN.

H. MEYERS is named, by *National Biscuit Co.*, as its new mill superintendent in Cheney. He succeeds B. J. EASON, retired.

GEORGE C. MARTIN, formerly chief project engineer for aircraft, *Boeing Airplane Co.*, is named chief engineer of firm's Seattle division. FRANK TERDINA takes over newly created post of engineering manager, industrial products division.

Weyerhaeuser Timber Co., Tacoma, names as vice president HOWARD W. MORGAN, manager of firm's pulp division. JOHN M. MUSSER is appointed assistant secretary.

DONALD F. MCCALL joins *Simpson Logging Co.* as assistant general manager of firm's *Everett Pulp & Paper Co.*, Everett. He comes from *Racquette River Paper Co.*, Potsdam, N. Y., where he was vice president.

LIEUT. GEN. LEWIS A. PICK, USA (retired) is newly elected vice chairman of *Georgia-Pacific Plywood Co.* He will make his headquarters at Olympia.

Aluminum Co. of America makes R. W. STEWART district purchasing agent for its Vancouver works. He previously served as acting Northwest district purchasing agent.

W. S. CALLENDER, formerly structural designer with *W. H. Witt Co.*, Seattle, joins *Concrete Products Association of Washington* in capacity of engineer-manager. He succeeds C. M. HOWARD, retired.

Crown Zellerbach Corp. appoints DEAN O. BOWMAN secretary of planning committee. He comes to this concern from National Production Administration, where he was assistant administrator in charge of policy coordination. RAY J. SCHADT, formerly resident manager of corporation's newsprint division, Port Angeles, is assigned to Portland office in connection with pending acquisition of *St. Helens Pulp and Paper Co.* HAROLD F. CARPENTER, formerly supervisor of firm's industrial and community relations

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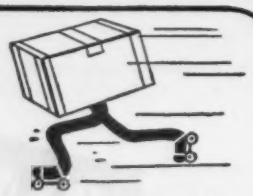

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at Camas, replaces R. J. SCHADT at Port Angeles. He is succeeded by RICHARD E. LAWTON, previously personnel assistant at Camas.

DAVID MAYERS, formerly engineering superintendent of *Kaiser Aluminum and Chemical Corp.'s* Trentwood rolling mill, is named works manager there. He replaces ARTHUR H. BRANSTAD, who becomes manager of Kaiser's fabrication division, Oakland. GLADE C. MILLER comes from *Jones and Laughlin Steel Corp.*, Cleveland, Ohio, to Trentwood works to take position of engineering superintendent. WILLIAM A. DITTMER, previously *Bonneville Power Administration* manager, is appointed Kaiser's power manager with headquarters in Spokane.

ASSOCIATIONS ELECT

Douglas Fir Plywood Association: President, S. EBERLY THOMPSON, vice president of *M & M Wood Working Co.*, Portland; vice president, H. B. GARRISON, vice president of *Evans Products Co.*, Coos Bay, Ore.; secretary, R. A. NEUMANN, president of *Elliott Bay Mill Co.*, Seattle; and treasurer, ARTHUR BERGGREN, general manager of *Puget Sound Plywood, Inc.*, Tacoma.

Southern California Food Processors Association: President, CHARLES KERN of *Kern Food Products*, Los Angeles; vice president, ALBERT VIGNOLA, JR., of *West Coast Packing Corp.*, Long Beach; treasurer, W. E. BEACH of *McKeon Canning Co.*, Burbank; and secretary, ELMER H. HEWLETT, Los Angeles.

American Rocket Society, Northern California section: President, F. G. BOLLO of *Shell Development Co.*, Emeryville, Calif.; vice president, W. J. BARR of *Detroit Controls Corp.*, Redwood City, Calif.; secretary, L. M. WHITNEY of *Shell Development Co.*, Emeryville; and treasurer, A. K. OPPENHEIM of mechanical engineering department, University of Calif., Berkeley.

American Society of Tool Engineers, Albuquerque chapter No. 93: Chairman, H. BAECKER, supervisor, *Sandia Corp.*; first vice president, D. B. KENNEDY, supervisor, *Sandia Corp.*; second vice president, F. H. DEIBER, tool engineer, *Sandia Corp.*; secretary, J. C. MOODY, supervisor, *Sandia Corp.*; and treasurer, W. I. PORTER, president of *Acoma Corp.*

National Association of Cost Accountants, San Francisco chapter: President, HEROLD H. NEHLS, *Army Audit Agency*; first vice president, GEORGE S. BROWN, secretary-treasurer of *Montebello Wine Co.*; second vice president, ROY B. OLIVER, chief cost accountant of *Schlage Lock Co.*; treasurer, GEORGE W. MEYER, assistant vice president, *American Trust Co.*; and secretary, VERNON V. RUHS of *Crown Zellerbach Corp.*

Manufacturers' Agents National Association: Chairman of executive committee, A. B. SMEDLEY of Altadena, Calif.; and Western vice president, E. P. GILSDORF, San Francisco.

Cooling Tower Institute: Treasurer, CLAYTON E. PICKUP of *The Fluor Corp.*, Los Angeles.

American Ordnance Association, Los Angeles post: President, ROBERT C. GEFFS, government contracts manager of *Clary Multiplier Corp.*, San Gabriel, Calif.; vice president, F. W. CONANT, senior vice president in charge of manufacturing for *Douglas Aircraft* at Santa Monica; secretary, R. W. RENIERS, contract administrator of *Standard Coil Products.*

Western TRADE WINDS

News about those who distribute and sell industrial equipment and materials

Brown Steel Supply Corp., a steel warehouse, is newly established in Los Angeles. President is PHILIP BROWN, recently from Detroit, where he was a vice president of *Detroit Steel Corp.* JAMES BROWN is vice president. L. W. WESTERBECK, sales manager, comes from *A. M. Castle & Co.*, where he recently resigned as district manager. Assistant sales manager is WESLEY M. SHERWOOD, who was formerly in charge of sales, *Dunning Iron Store Co.*

J. Brown

P. Brown

W. M. Sherwood

L. W. Westerbeck

J. E. PERKINS transfers from Southern California territory of *Borden Company's* chemical division to its San Francisco territory. He succeeds J. J. VOGNER, who joins *Delco Chemicals, Inc.*

General chemical division, *Allied Chemical & Dye Corp.* appoints W. L. HOEFLING as manager of its San Francisco branch. He replaces J. B. SUTLIFFE, transferred to company's New York office.

ROBERT L. SMALLMAN is elected to office of vice president in charge of sales, *Consolidated Engineering*, Pasadena, Calif. He was formerly director of sales for Consolidated's electro-mechanical instrument division.

Portland Woolen Mills, Inc., Portland, elects F. C. SCHULTZE vice president in charge of sales.

J. H. MCMILLEN, formerly West Coast sales manager of multiwall bag division, *St. Regis Paper Co.*, is appointed by *Crown Zellerbach Corp.* as assistant manager of its multiwall bag sales.

Phillips & Edwards Electric Corp., San Francisco, and *Tri-County Electrical Wholesalers* of San Bernardino are newly appointed *Westinghouse Electric Corp.* wholesaler-agents.

Stevens Equipment Co., Inc., Salem, Ore., is named a distributor for *Allis-Chalmers Manufacturing Co.'s* motors, controls and texrope drive equipment in seven Oregon counties. This area covers counties of Marion, Yamhill, Polk, Lincoln, Benton, Linn, and Clackamas.

Airsupply Co., division of *The Garrett Corp.*, moves to Wilshire Blvd., Beverly Hills, Calif.

MARTIN M. GROARK is appointed Western district manager by *Inland Wire Products Co.* of Chicago. He will temporarily headquarter at San Lorenzo, Calif., until permanent office and warehousing facilities are established.

M. M. Groark

W. G. Carrie

American Wheelabrator & Equipment Corp. of Mishawaka, Indiana, appoints WILFRED G. CARRIE as district manager of firm's sales office in Seattle. He was formerly a project engineer in dust and fume control division of company's home office. GEORGE C. TOLTON, formerly in charge of Seattle office, moves to Greensboro, N. C., as district

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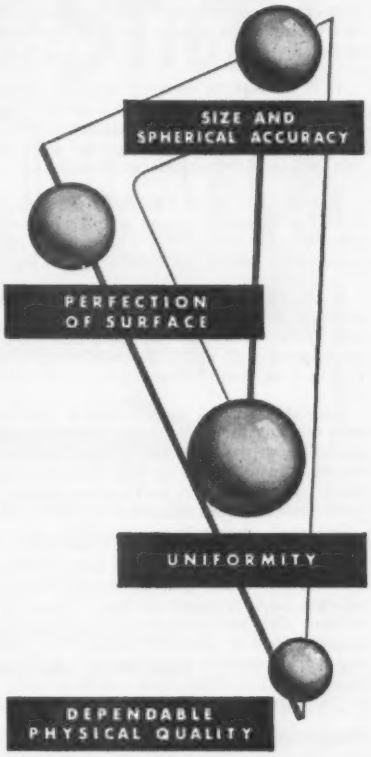

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Largest Independent and Exclusive Metal Ball Manufacturer
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manager there. DAVIS TAYLOR, district manager, and GEORGE THARP, district service engineer, move headquarters from San Francisco to San Carlos, Calif.

G. S. Marshall Co., Pasadena, Calif., electronic engineering representative, forms an instrument division with DR. WALTER EAST in charge.

E. S. BJONERUD, formerly assistant manager of industrial sales in San Francisco for *General Electric Co.*, takes over new responsibilities as manager of industrial sales in this area for firm's apparatus division.

WALTER MOORE of *The Republic Supply Co. of California* is named manager of machinery sales and service. Company is appointed distributor for Kraloy plastic pipe.

W. L. BRAUNING, formerly redwood sales manager for *Simpson Logging Co.*, joins *Eureka Redwood Lumber Co.*, Eureka, Calif., a subsidiary of *M and M Wood Working Co.*, Portland, as its sales manager.

RAGNAR GISKE is named Seattle district sales manager for *General Petroleum Corp.'s* marketing department. He replaces JACK A. SIMPSON, who moves to San Francisco as district sales manager, south coast district, Northern California division.

ROBERT D. JONES, formerly a field representative in Los Angeles area for *Libbey-Owens-Ford Glass Co.*, is named Pacific regional sales manager of firm's Corrulux division with headquarters in Los Angeles. *Reliable Steel & Builders Supply Co.*, Los Angeles, is appointed distributor of superfine glass insulation throughout southern Calif. and in parts of southern Nevada. *Roe-James Glass Co.*, with a branch warehouse in Helena, Mont., is also a newly appointed distributor of this fiber glass material.

JAMES W. RIMMER, formerly manager of market development, *U. S. Steel Corp.*, Columbia-Geneva Steel division, San Francisco, is promoted to manager of sales in concern's Salt Lake City office. JAMES B. BLACK, JR. becomes assistant manager of sales for Denver office. He was formerly sales manager for bar and semi-finished bar products, San Francisco office. H. B. MONTROSS is appointed manager of market development, and CHARLES F. B. PRICE, JR., becomes sales engineer for wire rope products, Columbia-Geneva Steel division.

Pacific Paint & Varnish Co., Berkeley, Calif., appoints ARTHUR H. DARLING as

A. H. Darling *E. E. Malin*

manager of its metal decorating department and EDGAR E. MALIN as district sales manager of its southern territory.

ROY W. ELLIOTT, formerly of Kansas, joins *Langley Corp.*, San Diego, as director of aircraft sales.

H. A. MERLO is named sales manager of *Rockport Redwood Co.* and *Rounds Lumber Co.*, succeeding D. H. LE BRETON, resigned. He was formerly in sales department of *Rounds and Kilpatrick Lumber Co.*, Cloverdale, a division of Rockport Redwood Co.

American Brake Shoe Co. appoints JOHN L. GOHEEN as its West Coast manager for commercial research. His headquarters are in San Francisco.

Sharpe Manufacturing Co. appoints *W. P. Fuller & Co.* as distributor for firm's portable paint spray compressors, spray guns, and accessories.

National Motor Bearing Co., Inc., Redwood City, Calif., establishes a sales office to service original equipment manufacturers in Southern California area with headquarters in Downey, Calif., plant of NMB's subsidiary, *Arrowhead Rubber Co.* Field engineer CARL WOLFF is in charge. Marketing of Arrowhead's ducting for aircraft continues as a function of Arrowhead Duct division at Long Beach.

Lynn and Brooks, Los Angeles, is appointed manufacturers' agent in eleven Western states for industrial lines of Sturdi-Bilt Steel Products, Cummins Portable Tools, Upson Bros. "Hold-E-Zee" screwdrivers, Wilton vises and powrarms, Continental Drill Corp., and Rockwell Tools, Inc.

Inet, Inc., Los Angeles, manufacturer of regulated selenium rectifiers, appoints BRUCE H. ATWATER as sales manager. He was formerly vice president of sales, *Pacific Airmotive Corp.*, Burbank.

The Torrington Co. appoints *Edward D. Maltby Co.* as distributor of its products in Southern California and Arizona with offices in Los Angeles, Maywood, San Diego and Phoenix.

Fairbanks, Morse & Co., scale, diesel, pump and electric motor dealer, opens a Seattle branch of its Portland office.

RALPH WELTY is appointed to Salt Lake City sales office of *The Trane Co.*, La Crosse, Wisconsin, manufacturer of heating, air conditioning and ventilating equipment.

R. R. LIGGETT, Prescott, Arizona, and *P & H Electric Motor Works*, Watsonville, Calif., are named distributors by *Sterling Electric Motors, Inc.*, of firm's electric power drives.

Black & Decker Manufacturing Co. moves San Francisco office to 4343 Third St. LESTER C. KAEFER, former San Francisco branch manager, transfers to Los Angeles as branch manager there. A. W. ESCOFFIER, who was branch manager at Portland, will assume same duties in San Francisco. PAUL POUNDS, formerly attached to San Francisco branch, moves to Portland branch where he takes over as sales engineer.

Utica Drop Forge & Tool Corp., Utica N. Y., appoints *D. James Murray Co.*, Seattle, as sales representative for Utica tools in Washington and Oregon in cooperation with *Gardner Distributing Co.*, Seattle, who now stocks this line.

EARL L. REARDON is newly appointed engineering representative for *The Stearns Co.* of Glendale, Calif.

E. Jordan Brookes Co., Inc., with offices in Los Angeles, San Francisco and Seattle, is named exclusive Western sales represent-

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OFFICES IN PRINCIPAL CITIES

ative for *Flexo Wire Co.*, division of *Copperweld Steel Co.*, Oswego, N. Y., producer of copper wire and copper braid.

Lippincott Co., Inc., manufacturers' representative, moves to new headquarters at 995 Market St., San Francisco.

Crum & Guttero, Los Angeles, and *W. G. Ballantyne Co.*, Portland, are now exclusive Western sales representatives for *Powers Manufacturing Co.*, Longview, Texas. Crum & Guttero will serve states of California, Arizona, and western Nevada. W. G. Ballantyne Co. will cover Oregon, Washington, and western Idaho.

WILLIAM SIMONITE is named sales manager for *Lemlar Manufacturing Co.*, Gardena, Calif.

Sherman Paper Products Corp., Los Angeles, makes two appointments to its sales staff. WARREN TOBECKSEN transfers from New York office to assume duties of advertising and sales promotion manager with headquarters in Los Angeles. JAMES BURGESS is named sales representative covering Oregon and western Idaho with headquarters in Portland.

ROBERT B. WELSHONS becomes *Ford Motor Co.* industrial engine representative in Northern California and Pacific Northwest with headquarters at Ford's assembly plant, Richmond, Calif.

VERNON C. ROLLINS is named sales representative, San Francisco, for *Archer-Daniels-Midland Co.*, Minneapolis linseed oil manufacturer.

J. B. THIBAULT, JR., formerly of *Soulé Steel Co.'s* sales department, Seattle, joins *Fryer Ford Co.*, Spokane, as sales engineer.

HAROLD A. PRICE, former chief engineer, is promoted to newly-created position of chief

C. J. Woodard *H. A. Price*

engineer and director of sales, and CLARENCE J. WOODARD is named West Coast sales manager for *The Rucker Co.*, hydraulic and pneumatic power transmission specialist, Oakland. Woodard was formerly manager of oil industry machinery division of *Pelton Water Wheel Co.*

Larshan, Inc., is named sales representative in California, Nevada and Arizona for *General Ceramics and Steatite Corp.* of Keasbey, N. J. Distributing firm names ARTHUR W. CHARRETT to handle General Ceramics' complete line. He will be located in Santa Monica.

A new Western branch office and warehouse is opened in Burbank, Calif., by *Ipsen Industries, Inc.*, of Rockford, Ill., manufacturer of heat treating equipment. SIDNEY TERWILLIGER is sales engineer, and ROBERT L. TOEPFER is firm's West Coast service engineer.

ROBERT REXROAD is newly appointed Southern California sales representative for

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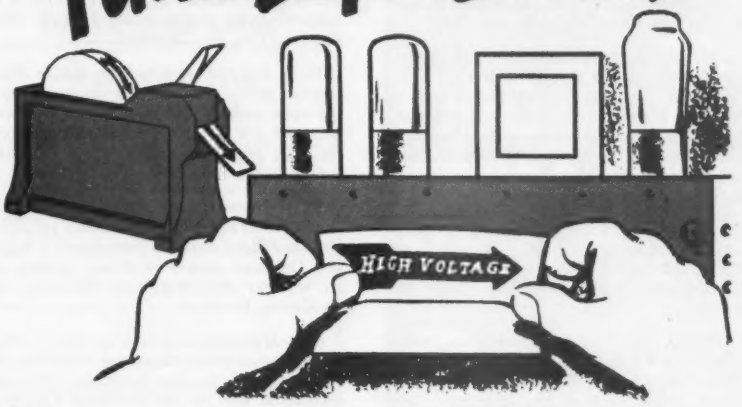

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Pomona Tile Manufacturing Co., Los Angeles. He will cover territory from Bakersfield to San Diego.

A. WAYCOTT joins sales staff of *Calstrip Steel Corp.*, Los Angeles, and takes over his assignment in Southern California area.

Refrigeration Engineering, Inc., Los Angeles, manufacturer of refrigeration and air conditioning equipment, appoints HAROLD A. HALLS as a member of its sales staff.

Cold Metal Products Co. of Calif. opens a new branch office at 111 Sutter St., San Francisco. THOMAS E. DEHART will be in charge of branch and will be Northern California sales representative for that firm and mill representative for *Cold Metal Products Co.*, Youngstown, Ohio. Territory served will be from Fresno, Calif., north.

Binks Manufacturing Co., maker of spray painting equipment, opens a branch sales office and warehouse at 950 Newhall St., San Francisco. RICHARD P. ROSSI heads this new office.

James H. Knapp Co., Los Angeles, makes agreements for distribution in United States, Mexico and Canada of all products of *Russ-Elektroofen K. G.*, Cologne, Germany.

De Castro & Associates, machinery company, moves to new location at 2031 Santa Fe Ave., Los Angeles 21.

HENRY JENSEN is appointed sales representative for *Ziegler Steel Service Co.* covering part of Los Angeles area.

G. S. Marshall Co., components division, Pasadena, is appointed, by *L. L. Constantin and Co.*, Lodi, N. J., maker of metal to glass vacuum seals, as its Western engineering representative.

ROBERT E. EBY joins *Weyerhaeuser Sales Co.*, Tacoma, as a member of its engieneering sales staff. He previously was with *West Coast Lumbermen's Association* as forest products structural engineer.

SEIBLY S. BUFFUM, recently returned from active duty with U. S. Marine Corps, is appointed sales manager of *Aircraft Metal Forming Co., Inc.*, Burbank.

E. B. GATES is assigned by *Union Hardware & Metal Co.*, Los Angeles, to duties of full-time assistant to *DeWalt Inc.'s* district manager for Southern California territory. He was previously assistant to industrial supply buyer for Union.

E. A. BERRY is appointed resident sales-engineer serving Pacific Northwest for *Oliver United Filters, Inc.*, of New York, Chicago and Oakland, maker of filters, pumps, etc. He will operate out of firm's Western sales division in Oakland.

Behr-Manning Corp. of Troy, N. Y., opens its newest branch office and warehouse at 1001 Sixteenth St., San Francisco. Office and warehouse will service Northern California and state of Nevada.

Crane & Hoist Engineering Corp. is moving to a new spot at 6515 Salt Lake Ave., Bell, Calif.

An exclusive sales franchise is awarded to *Glen L. Codman Corp.* for Ross carrier and Ross lift-truck line of materials handling equipment by *The Clark Equipment Co.*, industrial truck division, Battle Creek, Mich. Franchise embraces all of Northern California from north Fresno County line to Oregon border and northern Nevada, and includes sales of parts and service as well as equipment. Codman Corp. has acquired all assets and facilities of *Ross Carrier Co.*, San Francisco, and will continue operations from that location.

Clayton Manufacturing Co., El Monte, Calif., appoints *The Standard Iron Works*, San Diego, as distributor for its line of steam generators, water heaters and tank heaters. Franchise area is comprised of San Diego, Riverside, Imperial and San Bernardino counties. Company handles boiler sales and repairs, heavy iron work and steel fabricating.

The Galigher Co., Salt Lake City, is appointed sales representative for *Sintering Machinery Corp.*, transportometer division, Netcong, New Jersey. Territory includes Utah and neighboring areas in Nevada, Idaho, Montana and Wyoming.

R. D. O'BRIEN is named vice president in charge of sales for *Kenworth Motor Truck Corp.*, Seattle truck and bus manufacturing firm. He will continue to serve as sales manager.

A new West Coast warehouse is being opened by *The Globe-Wernicke Co.* of Cincinnati. Located in Emeryville, Calif., it will service dealers in California, Washington, Oregon and Nevada. Warehouse is under managership of FRED M. FOSTER, JR.

KENNETH B. LARKIN is appointed district representative by *Frank G. Hough Co.*, Libertyville, Illinois, manufacturer of "Payloader" tractors and shovels. His area, firm's sales territory No. 7, includes Washington, Oregon, Idaho and Montana. He replaces H. E. THOMAS, who becomes district representative of sales territory No. 1.

PAUL WINKLER is named vice president and director of sales for *Bardwell & McAlister, Inc.*, Los Angeles.

Advertising firm of *Ley and Livingston* becomes San Francisco office of *Caples Co.* GASTON J. LEY and ROBERT J. LIVINGSTON, agency partners, will continue to pilot new Caples office with Ley as manager and Livingston as vice president.

Campbell and George Co., San Francisco manufacturer's representatives, announce addition of RAY ANSON and M. L. FOWLER as full partners.

Seattle is new location of four sales divisions of *B. F. Goodrich Co.*

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are ⅛ inch short of contracted space to allow for borders and composition. Rates are $7.50 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

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THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS, DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

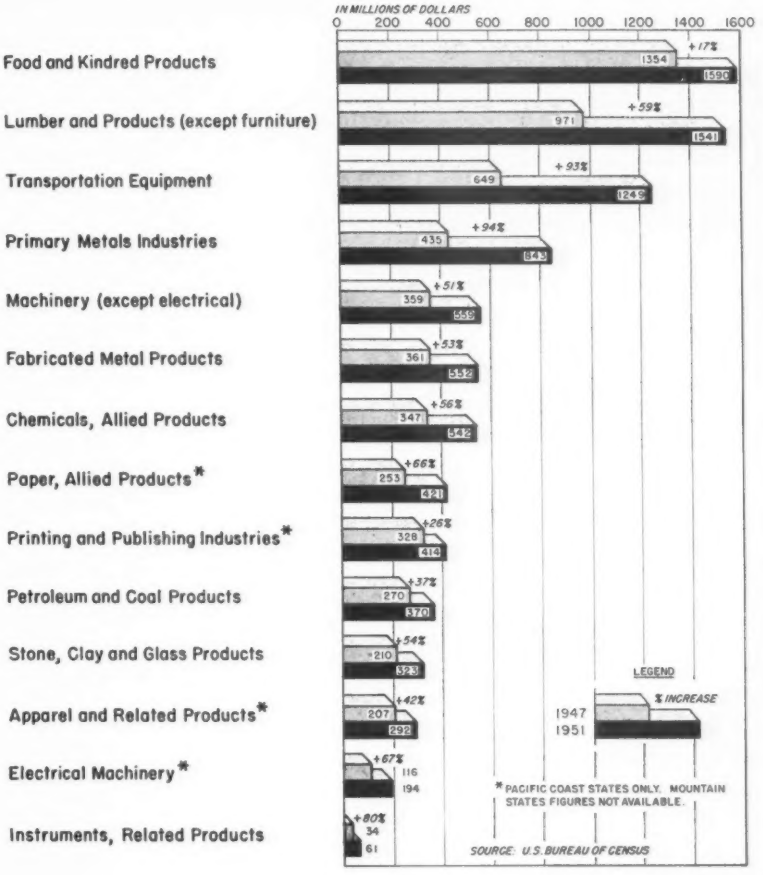
HOW THE WEST'S INDUSTRIES HAVE GROWN

THE WEST'S INDUSTRIES are exhibiting a dynamic growth rate, and the manufacturing pattern is changing as the region's industrial base broadens under an expanding economy. The vital statistics revealing these changes during the 1947-1951 period are compiled and charted here by the editors of *Western Industry* from the 1951 Annual Survey of Manufactures by the U. S. Census Bureau, released this March.

In rate of growth, some of the West's newer industries have made the biggest gains. Primary metals is the lustiest baby, with a growth of 94% reflecting the expansion of the West's steel, aluminum and copper facilities. A close second is transportation equipment (93%), with aircraft being the major portion of this classification.

Third place "growth" industry (80%) is instruments and related products. Tremendous development of the West in production of scientific instruments and electronics equipment is the dynamic factor here (see article on pp. 33-35 of this issue).

Next in rate of growth is the paper and allied products industry (66%). Reason here is that the Pacific Northwest is becoming the greatest pulp producing area in the entire country, and paper converting facilities are being developed rapidly in California where the greatest consumer market exists.



Food products and lumber and its products still maintain the two leading positions in the West's industrial economy. The West has been the center of fruit and vegetable processing for a number of years, producing nearly all of this country's output of canned food and dried fruit packs. The West is also a pioneer in the development of frozen foods and in the last decade vegetable canning here has increased at an enormous rate.

Lumbering and wood products has almost overtaken food products as the West's major industry. Forests in other areas of the country have been largely depleted and the country has had to turn to the West for its lumber supply.

A section of the June 1953 issue of WESTERN INDUSTRY—609 Mission Street, San Francisco 5, Calif.

ALASKA

CONTRACT AWARDS—Corps of Engineers in Alaska award: to Lytle, Green & Birch, Seattle, a $4,206,268 contract for 240 units of family housing at Ladd Air Force Base; to a joint-venture by Lytle, Green & Birch and Wyatt & Kipper, a $2,665,520 contract for expansion of heating and power plant at Eielson Air Force Base.

ALASKA FERRY SERVICE—Proposed ferry operation between Seattle and Alaska, at an estimated cost of $65,000,000, is discussed in Seattle with Gov. Frank B. Heintzleman. Four express ferries, at a total cost of $25,000,000, and two LST's at $1,800,000 are planned for in engineering studies made for Juneau company headed by James M. Hawthorne, Seattle. Vessels, traveling at 17 or 18 knots, would carry freight cars, trucks, automobiles and passengers, to seven harbors in southeast Alaska.

CALIFORNIA

MERGER OF AERO SCHOOLS—Northrop Aeronautical Institute, Hawthorne, merges with California Flyers School of Aeronautics in Inglewood upon sale announced by Northrop Aircraft, Inc. Combined operation will use Northrop name and California Flyers grounds and buildings, with total of over 700 students.

NEW ORDNANCE CONTRACT—Anaheim Division of Northrop Aircraft, Inc., receives $3,800,000 contract for manufacture of telescope mounts awarded by U. S. Army Ordnance Corps. Order calls for production of 554 mounts for panoramic telescopes on 105 mm. and other self-propelled howitzers.

BONE ENGINEERING EXPANDS—Bone Engineering Corp., Glendale, acquires Centrifugal Investment Casting Co., Burbank, in expansion move to produce wider variety of electronic component parts. Plant has area of 8,000 sq. ft. with facilities for both centrifugal and investment castings.

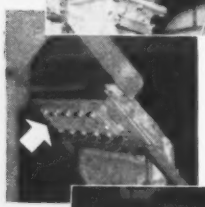
FUEL CELL UNIT FOR GOODRICH—B. F. Goodrich Co. resumes production of aircraft fuel cells, suspended in 1946, at its Los Angeles plant. Building modification of 50,000 sq. ft. area and installation of equipment will cost about $225,000. New operation may add work force of 200 to present payroll.

NEW TRIANGLE STEEL HEADQUARTERS—Triangle Steel & Supply Co. opens new plant and warehouse in Los Angeles on Bandini Blvd. near Downey Rd., with stocks of over 50,000 steel, metal and wire items; special cutting, shearing and burning operations; and reinforcing steel service.

Test Proven Stronger!

Dings Perma-Plate Magnets Do These Jobs Better

PROTECT PRODUCT PURITY
THIS chocolate processor relies upon non-electric Dings Perma-Plates—proven strongest in the laboratories of one of the world's largest cereal makers—to remove fine iron particles that could contaminate his product.



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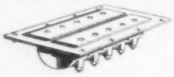

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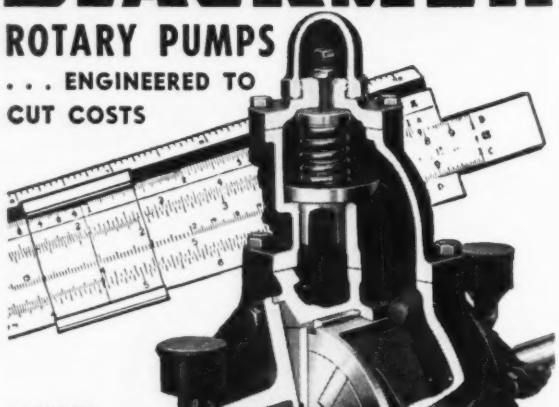

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SIZE: 1¼" through 8"

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"FACTS ABOUT ROTARY PUMPS"

BLACKMER LIQUID MATERIALS HANDLING

BLACKMER PUMP COMPANY • GRAND RAPIDS, MICH.

ACME ELECTRONICS BUILDS PLANT—Construction starts on new 51,000-sq. ft. office and factory building for Acme Electronics, Inc., Pasadena, a subsidiary of Aerovox Corp., on a 9½-acre site in Monrovia. New plant will produce Aerovox capacitors and Acme's own line of electronic components, with employment of an additional 200 persons.

FEDERAL ELECTRIC EXPANSION—Federal Electric Products Co. of Newark, N. J., completes new plant in Los Angeles for manufacture of safety switches, switchboards, circuit breakers and related electrical equipment, to serve expanding markets in the Western States. New plant has 45,000 sq. ft. of floor space. Federal Electric recently acquired Pacific Electric Manufacturing Corp., San Francisco, in $4,500,000 purchase.

LICENSE ENGLISH FIRM—Hamer Oil Tool Company, Long Beach, licenses Joshua Hindle & Sons, Ltd., of Leeds, England, to manufacture and market Hamer Line blind valves in England and other sterling areas.

GROUND SERVICE GOES UNDERGROUND—United Air Lines announces plan to install at San Francisco and other major terminals fixed power and gasoline outlets for servicing aircraft, similar to those already in use at Chicago. Fuel and power pits at each plane parking position eliminate need for gasoline trucks and tractor-towed heavy generators. Gasoline and electric power are supplied via underground lines.

RUBBER PLANT—Midwest Rubber Reclaiming Co., East St. Louis, begins construction of $2,500,000 rubber reclamation plant in Paramount. McNeil Construction Co. is building plant, which will be completed by end of year. Annual production of plant will be about 10,000 tons of rubber and employment about 100.

ORDNANCE ORDER FOR HALL-SCOTT—Berkeley plant of Hall-Scott Motor Division, ACF-Brill Motors Company, receives $3,688,000 order for gun-recoil mechanisms, major part of a $4,455,000 contract awarded ACF-Brill by U. S. Army Ordnance Corps. Plant will install special manufacturing equipment.

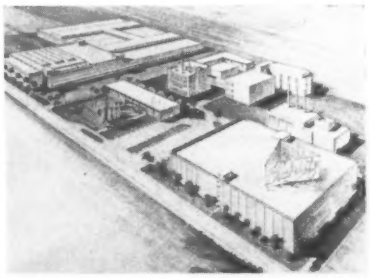
STEEL FOR FORD PLANT—Alameda Works of Bethlehem Pacific Coast Steel Corp. receives contract for fabrication of structural steel for Ford Motor Co.'s new San Jose assembly plant. Erection of steelwork by Bethlehem Pacific will start this fall.

ONE MILLION MARK FOR CHRYSLER—Millionth car built by Chrysler Corp. in California leaves Los Angeles assembly plant June 17. Los Angeles and San Leandro plants are producing passenger cars and trucks at a rate of over 100,000 a year, in addition to aircraft subassemblies and other defense work.

RENOVATION — California Cornice Steel and Supply Corp. changes firm name to Calcor Corp. Company's present-day production includes prefabricated industrial buildings, water-softener tanks, cement buggies, and wide variety of aircraft parts.

POWER PLANT—Southern California Edison Co. orders 156,000-kw. turbine generator for its Redondo Beach Station from Westinghouse Electric Corp. New machine, scheduled for shipment late in 1954 from Westinghouse Steam Division plant in South Philadelphia, Pa., will add 7% capacity to power system. At present four 60,000-kw. generators serve the Redondo Beach steam power plant and another 156,000-kw. unit is under construction.

SCHLITZ PLANT FOR WEST COAST—Architect's drawing of $20,000,000 brewery being built for Jos. Schlitz Brewing Co. on a 35-acre site in San Fernando Valley, near Van Nuys. General contractor is P. J. Walker Co.; architects are Harley, Ellington and Day, Detroit, in cooperation with two Los Angeles engineering firms, Brandow & Johnson and Dames & Moore. Bethlehem Pacific will supply and erect some 1,700 tons of structural steel for the plant.



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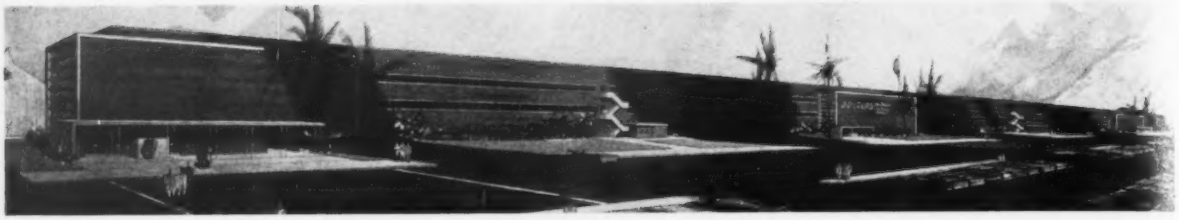

REHAB PROJECT—Douglas Aircraft Co., Inc., El Segundo Division, begins over $1,000,000 conversion of former aluminum manufacturing structure for use as administration building at its B-6 location in Torrance. Plans prepared by Van Dyke and Barnes, Los Angeles, call for remodeling of 102,000 sq. ft. windowless brick building to provide additional floor, as well as continuous windows, elevators, stairways, and heating and ventilation. Entire $10,500,000 alteration and rehabilitation project at Torrance has converted former ALCOA plant to aircraft produuction in 14 months.

NEW INDUSTRY FOR CALIFORNIA—Light Metal Processors, Inc., Redwood City, formerly of Chicago, plan construction of $250,000 plant for rustproofing steel, under first license granted by American Mollerizing Corp., Beverly Hills. Said to be widely used in Sweden, mollerizing is a process for coating steel with aluminum to prevent rust or corrosion.

CROWN ZELLERBACH OFFER ACCEPTED—More than minimum 80% of shares of St. Helens Pulp and Paper Co. are exchanged by stockholders for shares of Crown Zellerbach, permitting acquisition of St. Helens by Crown Zellerbach. Merger receives approval of circuit court at Portland and California Commissioner of Corporations.

CERTIFICATES OF NECESSITY—National Production Authority issues certificates of necessity for following defense-connected industrial projects: Mearl Corp., Monterey, $477,500 for fire fighting foam solution; Pacific Gas and Electric, San Mateo and Moraga, $2,463,660 for electric power; Oil Terminals Co., Alviso, $84,000 for petroleum storage; Tidewater Terminals Co., Inc., Pinole, $3,318,200 for petroleum storage; Shell Oil Co., Monterey, $121,000 for gasoline storage; Southern Pacific Co., San Francisco, $53,685 for railway transportation; Navajo Freight Lines, Inc., Oakland, $40,115 for motor freight transportation.

CHERRY CANNERY—S and W Fine Foods purchase 10-acre site in Stockton for construction of canning facilities in time for this year's cherry crop.

KITTEL-LACY, INC. — Lacy Manufacturing Co., manufacturer of wind tunnels, vacuum and pressure tanks and other aircraft-related equipment, and Kittel Muffler & Engineering, Inc., producer of industrial mufflers, Los Angeles, form jointly-owned subsidiary, Kittel-Lacy, Inc., to design and build sound abatement facilities for jet engines.

SHIPYARD LEASE — Plant Shipyard Corp., Alameda, leases 24-acre adjoining site from U. S. Navy. Yard is equipped with four building pits, pier, shops, warehouses and corner buildings; was used during World War II for building floating drydocks.

COLD STORAGE PURCHASE—Turkey marketing group buys two storage plants for $625,000 from National Ice & Cold Storage Co. of California: one in Los Angeles with a capacity of 524,921 cu. ft. of low-temperature warehousing, and 55,506 cu. ft. of sharp freezing —35 deg. temperature; the other in Vernon with a capacity of 691,910 cu. ft. Two plants will be known as National Storage

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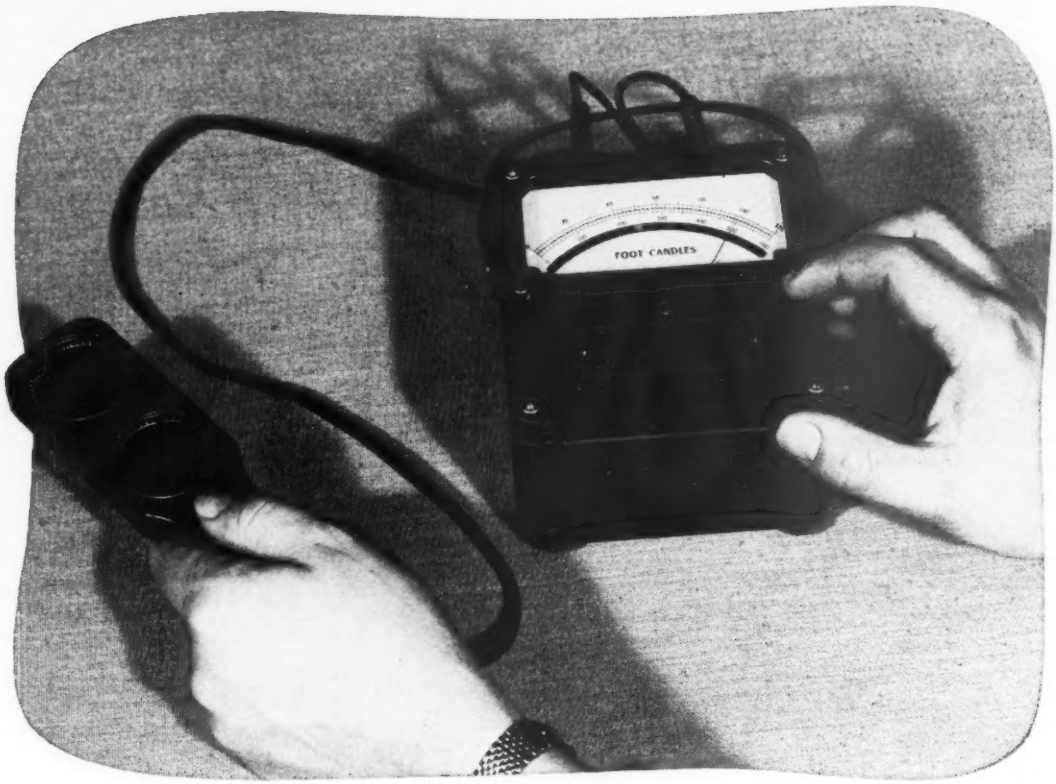
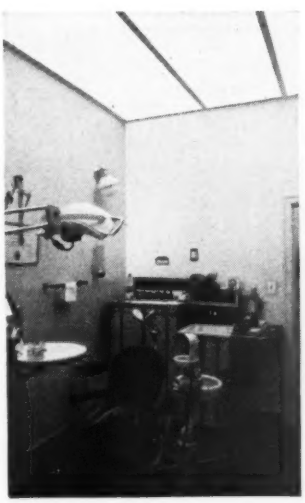


How this little box can help save you money

Reports from California manufacturers in many different fields show that planned lighting can increase output as much as 15%...which explains the value of the footcandle meter above. With it and other instruments, a lighting engineer can show you ways to improve plant and office lighting that will help boost your production. And this service is free!

Office output hiked. Whether performed by a dentist or an office clerk, close work indoors requires high levels of lighting—sometimes as much as 100 footcandles. But by increasing work output per man-hour, good lighting pays off quickly. It's easy to understand when you consider P.G. and E.'s low electric rates.



Plant errors cut. Improved plant illumination helps boost the speed and accuracy of precision jobs of all types, cuts down the waste of materials. And it also helps prevent accidents. If your lighting hasn't been checked by an engineer, have it done now. Remember, this service is free and may save you money.

For free planned lighting advice, consult your lighting contractor or P.G. and E. lighting engineer

P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY

6X-53

Co. National Ice & Cold Storage continues to operate 10 remaining plants.

ENGLISH SUBSIDIARY FOR FMC—Food Machinery and Chemical Corp., San Jose, acquires a controlling interest in Varley Pumps & Engineering Limited of Brentford, Middlesex, England. Varley, manufacturer of gear-type pumps since 1931, will begin manufacture of FMC's lines of pumps, agricultural sprayers, and canning and food processing machinery. Operation will continue under present management.

PLANT EXPANSION—Construction begins on a warehouse and office building for Kortick Manufacturing Co., San Francisco, manufacturers of pole line hardware. Building, 57,000 sq. ft. in size, of pre-cast concrete, is being erected by Johnson & Mape Construction Co., Inc. Site adjoins present plant at 5600 Third St. New building will expand total operations area to about 140,000 sq. ft.

PLANT MOVES—Pastushin Industries, Inc., manufacturers of aircraft hardware, including self-sealing rivets, moves to a new 5,000 sq. ft. plant, located at 501 North Prairie Ave., Hawthorne.

REFRIGERATED JUICE WAREHOUSE—Construction begins in Corona on a new 50,000 square foot $450,000 refrigerated juice storage plant for Exchange Lemon Products. Improvements costing about $300,000 are being made in the present juice products building to enlarge refrigeration equipment and add manufacturing capacity.

NEW METAL TREATMENT PROCESS—American Metaseal Corp., Los Angeles, opens new plant employing initial force of 15 for special processing of porous metals.

VARD ENGINEERING DEPARTMENT EXPANDS—Engineering department of Vard, Inc., Pasadena, moves into new brick and steel building adjoining other Vard properties on Foothill Boulevard. Move facilitates company's activities in product development and industrial design, tooling and manufacturing. Special projects, laboratories and testing equipment remain in the main building at 2981 Colorado Street.

RICE DRYING AND STORAGE PLANT—Construction is under way on a $1,800,000 rice drying and storage plant in West Sacramento for Farmers Rice Growers Co-operative, San Francisco. New plant, which will be as high as a 10-story building and have capacity for more than 400,000 bags of rice (each weighing 100 lbs. net) in its 40 bins, is scheduled to be ready by October 1. Co-op plans construction of a new mill at the plant next year.

NEW GOODRICH WAREHOUSE—B. F. Goodrich Co. plans new 81,088 sq. ft. tire warehouse in Los Angeles, to be completed and occupied by mid-July. Building will be of concrete construction, with loading docks for 6 railroad cars and 8 trucks. Goodrich will lease the new building from owner and builder Albert Levinson of Los Angeles.

CONTRACTS ON NORTHROP'S PALMDALE FACILITIES—Vinnell Co., Inc., of Alhambra, begins work on flight service building, utility building and four smaller structures for Northrop Aircraft flight testing operations at Palmdale Airport. Construction will be completed by January 1, 1954. Total cost of Northrop buildings will be over $2,500,000, including architectural services of Holmes and Narver, Inc., of Los Angeles. Area of buildings will be about 250,000 sq. ft. on a 227-acre site assigned Northrop, builders of the Scorpion F-89.

DUCOMMUN METALS BUILDS IN SAN DIEGO AREA—Ducommun Metals & Supply Co. of Los Angeles purchases 3.6 acres in National City for construction this year of a 58,000-sq. ft. warehouse, 12,000-sq. ft. store, and 3,000-sq. ft. office. New operation will employ between 35 and 50 persons.

BUYS CLEVELAND FIRM—Parker Aircraft Co. of Los Angeles, subsidiary of Parker Appliance Co. of Cleveland, acquires aircraft-valve manufacturing firm, Proof Industries Corp., Cleveland. Los Angeles plant and facilities of purchased firm will operate as Proof Division of Parker Aircraft Co.

TO PRINT NEWSWEEK—Newsweek negotiates contract with Pacific Press, Inc., Los Angeles, for printing 20% of magazine's total press run for distribution in Western States.

WINDOW SHADE FACTORY MOVES—Breneman-Hartshorn, Inc., moves to 30,000-sq. ft. plant in Emeryville from location in San Leandro. Formerly Stewart Hartshorn Co., firm was recently purchased by C. W. Breneman Co. of Cincinnati, manufacturer of window shade cloth, shade rollers, and venetian blinds. Monadnock Mills takes over vacated San Leandro plant.

LOGGING IN NATIONAL FOREST—Matthews Lumber Co. is high bidder for 12,100,000 board-ft. of lumber to be removed from Sierra National Forest. Firm's offer to Forest Service is $34.10 per 1,000 ft. of Ponderosa and Jeffrey pine; $40.90 for sugar pine, and $2.95 for red and white fir and incense cedar. Company asks 50 cents per 1,000 board-ft. for thinning, pruning, and replanting.

DODGE BODY PLANT—New Dodge plant in San Leandro begins production of passenger car bodies, for final assembly plants in San Leandro and Los Angeles, as well as Hamilton Standard aircraft propellers. Plant, 750,000 sq. ft. in area and employing about 900 persons, can turn out one Dodge or Plymouth car body every two minutes.

INDUSTRIAL TRACT DEVELOPMENT—Los Angeles business group buys meat plant and 12¼ acres of ground in downtown L. A. from Cudahy Packing Co. Cudahy will continue to occupy oleomargarine and cleanser factories on a long-lease basis. Other buildings will be adapted for manufacturing and cold storage or demolished. Vacant land is to be developed for light and heavy industry.

SYLVANIA AT FULLERTON—Sylvania Electric Products, Inc., plans to acquire 20-acre site at Fullerton and construct plant for production of television picture tubes.

MOST MODERN IN COUNTRY—United States Steel Corp. completes expansion program at Pittsburg Works and increases sheet steel and tin plate production capacity by 68%. More than 12½ acres of floor space are added to former 24-acre area of sheet and tin mill, housing new 4-stand cold reduction mill and other processing and testing facilities for finishing flat steel. New facilities also include industrial relations building and parking lot equipped with flood lighting, specially designed highway entrance, and pedestrian underpass to plant. Employment at plant is now over 4,800. Power consumption has increased to estimated 240,000,000 kw. per year, which required major addition to PG&E facilities at plant.

COLORADO

NATIONAL BISCUIT ADDITION—National Biscuit Co. begins construction of new additions totaling 18,000 sq. ft. to its 90,000-sq. ft. bakery in Denver. Project will cost over $1,000,000 and is scheduled for completion by December.

STANDARD FURNITURE—Work starts on new $250,000 building for Standard Furniture Manufacturing Co., Denver. Plant design provides for 60,000 sq. ft. on one floor, allowing assembly-line production of furniture. Company payroll will be increased from 55 to over 100 upon completion of plant in late summer.

TELLURIDE MINES PURCHASED—Idarado Mining Co., Ouray, purchases Telluride Mines, Inc., lead and zinc workings previously scheduled to be closed. Consolidation will permit joining of two companies' tunnels and resulting econ-

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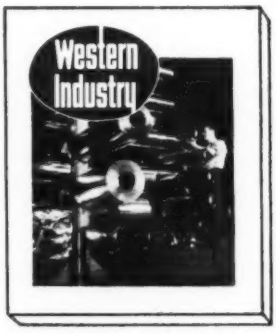

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67

omies of operation. Idarado Mining is three-quarters owned by Newmont Mining Corp. of New York.

SITE UNDECIDED — National Farmers Union indicates it will probably not locate new $6,000,000 fertilizer plant in Grand Junction because of need for very low cost power and considerable sulphuric acid.

IDAHO

SNAKE RIVER DAMS — Idaho Power Co. applies to Federal Power Commission for license to build two power dams across Snake River, one a $45,800,000 development at Hells Canyon, and the second a $65,594,800 project known as Brownlee on the Idaho-Oregon line.

NEW MEXICO

HELIUM PRODUCTION — Bureau of Mines Navajo plant near Shiprock swings into full-scale production of helium from natural gas reserves in Rattlesnake field. Operating crew numbers about 65 men. Gas is shipped via high-pressure pipeline from plant to Gallup, closest rail point. Bureau of Mines, world's sole producer of helium in commercial quantities, began reactivation of Navajo plant in February.

HARDBOARD FROM DESERT BUSH—Civic leaders in Las Cruces study plans for proposed $4,000,000 plant to manufacture hardboard from creosote bushes. Commercial possibilities of abundant desert plant are put forward by John van Ginhoven, former head of Small Defense Plants Administration, who with J. F. T. Berliner, chemical engineer, ran an experimental processing plant in Springfield, Mo. Means of financing proposed plant are sought.

APPROVAL SOUGHT — Kerr-McGee Oil Industries apply to Navajo Advisory Committee for approval of proposed $3,500,000 uranium processing plant and granting of new leases, in addition to the 2,500 acres now held by Kerr-McGee, to assure long-term operations at a planned capacity of 73,000 tons of ore processed yearly.

OREGON

TANK TRUCK LINE EXPANDS—System Tank Lines, Portland, adds equipment, personnel, and interstate permits of Lang Transportation Co., subject to approval of ICC, in purchase made jointly by STL and West Coast Fast Freight, Inc., Los Angeles. About 200 Lang employees and about 200 pieces of equipment will be absorbed. Headquarters of STL will move to Los Angeles.

ALUMINUM PLANT AT THE DALLES—Harvey Machine Co., Torrance, Calif., undertakes construction of $3,000,000 steel and aluminum building, first unit in planned $65,000,000 government aluminum reduction plant at The Dalles. Agreement with General Services Administration covers erection of a two-potline aluminum reduction plant and an alumina plant. Plant, to have a capacity of 54,000 short tons of primary aluminum, will be completed by May 1, 1955.

STOCKHOLDERS ASSENT TO SALE—Long-Bell Lumber Co. of Kansas City, Mo., buys over 90% of minority common stock at $200 a share and 64% of common stock held by Central Coal & Coke Corp., to acquire control of Oregon-American Lumber Corp., Vermonia.

NEVADA

PLANT EXPANSION—Gabbs plant of Basic Refractories Mining Co., producer of refractory clinker, will increase capacity with a $400,000 expansion program.

UTAH

AMMONIA PLANT — Utah Chemical Co. applies to National Production Administration for approval of proposed $18,800,000 plant to produce ammonia, nitric acid and ammonium nitrate from natural gas. Plant will be located either in Sanpete Valley or near Nephi. Catalytic Construction Co., Philadelphia, subsidiary of Houdry Process Corp., will build plant. Output of plant is to be 278 tons of anhydrous ammonia, 475 tons of nitric acid and 587 tons of ammonium nitrate per day.

WYOMING

SOCONY-VACUUM BUYS BASIN SITE—Socony-Vacuum buys portion of total 160-acre area required for planned sulphur plant, at a location seven miles south of Basin. Company has seven wells completed and three drilling in the Manderson unit.

WASHINGTON

THOUSAND-MILE CABLE ORDER—Bonneville Power Administration awards $3,985,000 contract to Aluminum Co. of America for 1,327 miles of 1.6 in. diameter high voltage power transmission cable. The steel-reinforced aluminum cable will be produced in Alcoa's Vancouver mill, for delivery in 1954. Use of cable will be 345,000-volt power lines in new Bonneville power grid from McNary and Chief Joseph dams to Portland-Vancouver and northwestern Washington areas.

GIANTS — Four 65,000-hp. electric motors built by Westinghouse at its East Pittsburgh, Pa., works are added at Grand Coulee Dam, tripling ability of dam to pump water for irrigation. Initial two motors were installed in 1951; long-range plan is a total of 12 pump motors. First deliveries of water were in 1952, to the Columbia Basin project.

PLANT CONVERSION—In wake of recent shut-down of magnesium operations at government-owned Mead plant, Pacific Northwest Alloys announces plan for $1,500,000 conversion to permit use of entire plant in production of ferro-chrome and other ferro-alloys. Plant would employ 400 men.

ANOTHER NEW PLANT FOR SCOTT PAPER—At cornerstone laying ceremonies for new $16,000,000 paper machine at Everett, Scott Paper Co. announces intention to build a second plant of same type at same location, to be installed and operating shortly after the first machine starts in January 1954. Plants will adjoin Scott's sulphite pulp mill.

SIMPLOT SOILBUILDER—J. R. Simplot Co., Boise, Idaho, begins construction of commercial fertilizer depot on 18-acre site in Walla Walla, to be in operation by August 1. Employing about 20 persons, the plant will batch and mix fertilizers, insecticides and herbicides, and supervise storage facilities at other points in the area.

PETROLEUM PIPELINE CONTRACT—Salt Lake Pipe Line Co. awards $4,500,000 contract for pipeline from Pasco to Spokane, an extension of existing 570-mi. line from Salt Lake City, to Lyles & Young, Avenal, Calif. Construction of the 135-mi., 8-in. line will start in June.

AIR FREIGHT TERMINAL — Seattle Port Commission approves $350,000 project for construction of freight facilities at Seattle-Tacoma International Airport. The first unit, a building 60 x 250 ft. in size, later to be lengthened to 600 ft., will be completed late this year at a cost of $210,000.

HELP WANTED—Boeing Airplane Co. will hire over 1,600 new employees, among them 500 beginner mechanics, at its Seattle and Renton plants by mid-July. Company's total payroll in the Seattle area will then reach about 32,700.

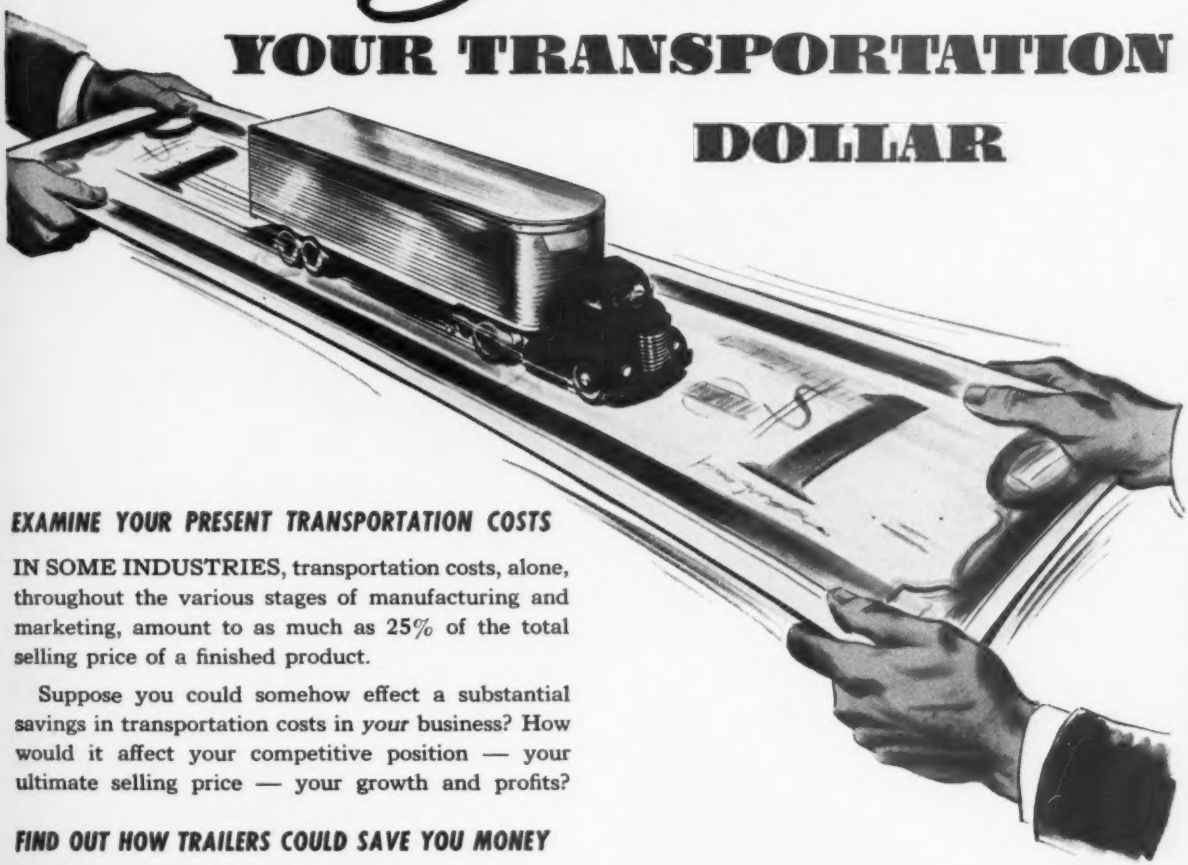
RHEEM EXPANDS — Rheem Manufacturing Co., Richmond, Calif., purchases water heater business and assets of Seidelhuber Iron and Bronze Works, Inc., Seattle, and will add full line of steel drums to plant's output. Seidelhuber Works continue operations, specializing in ornamental iron.

CONTRACTOR CONTINUES AT HANFORD—J. A. Jones Construction Co. of Charlotte, North Carolina, will continue to perform minor construction and plant maintenance at Hanford Works, under direction of General Electric Co., according to recent announcement of Atomic Energy Commission. Jones Co. has been contractor for this work since August 1950 on a joint basis with Guy F. Atkinson Company, which withdrew from contract renewal. About 625 persons are employed.

FIRST SUGAR RUN AT MOSES LAKE—New plant of Utah-Idaho Sugar Company at Moses Lake will be completed in time to process 1953 sugar beet crop. Personnel and equipment have been transferred from the company's Chinook, Montana, plant, no longer in operation.

WATERFRONT LOT PURCHASED—Astoria Seafood Co., formed recently to buy and process fish, purchases one lot of waterfront property in downtown Astoria from Columbia River Salmon Co.

HOW TO STRETCH YOUR TRANSPORTATION DOLLAR



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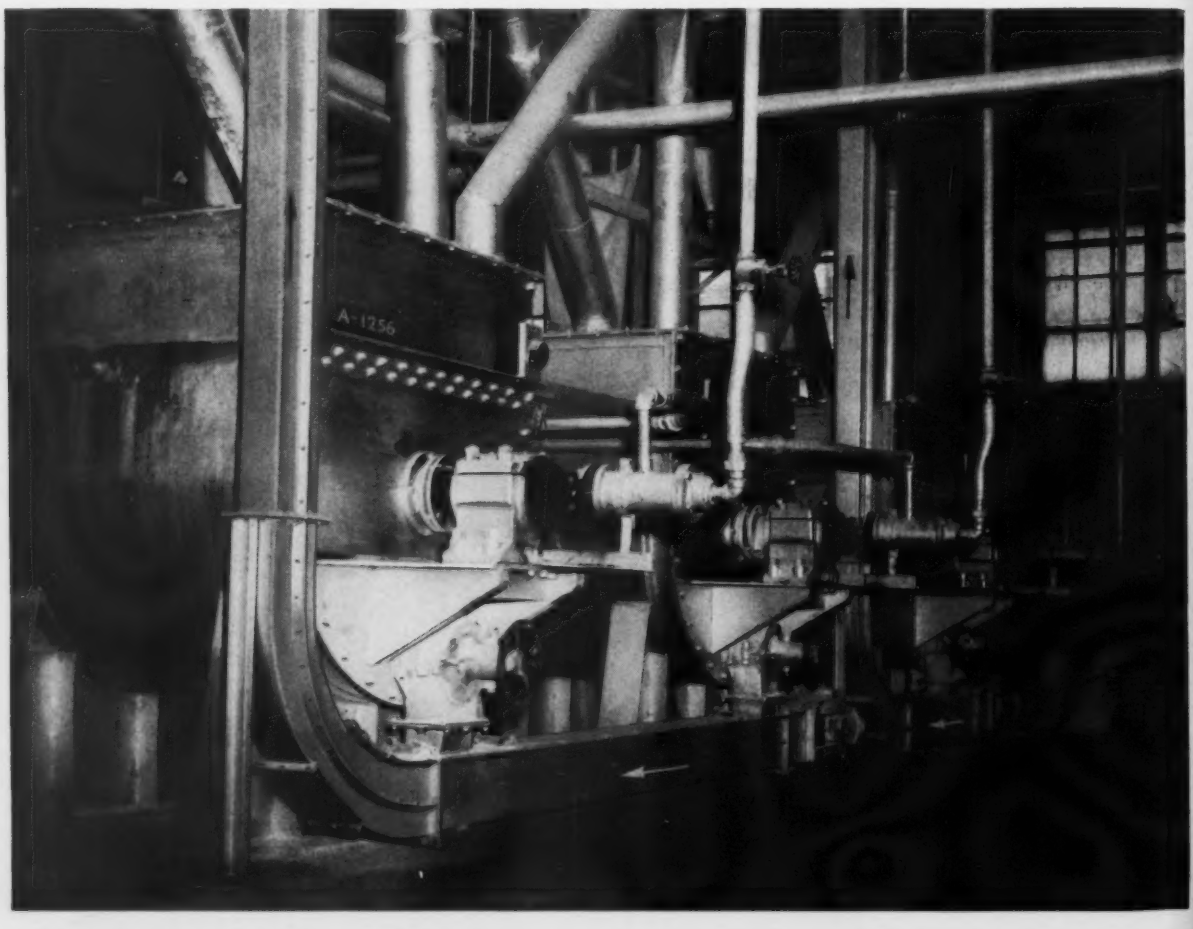

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